

Revised Draft Report

Coastal Management Program for the Shoalhaven Open Coast and Jervis Bay

Shoalhaven City Council

28 November 2023

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Acknowledgment of Country



We acknowledge the traditional owners and custodians of this country and their continuing connection to the land through culture and community. We pay our respects to Elders past, present and future.

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EXECUTIVE SUMMARY

Overview of the CMP

The open coastline of the Shoalhaven City Council Local Government Area (LGA) provides a diverse array of social, cultural, environmental, and economic benefits. Located on the south coast of New South Wales (NSW), the Shoalhaven coastline provides a stunning natural environment, a multitude of recreational opportunities, and is the cornerstone of the coastal lifestyle that is so highly valued by the local community and visitors alike.

However, the coastal zone is facing increasing pressures from natural hazards, urban development, population growth, and climate change. In order to address these risks, a Coastal Management Program (CMP) has been prepared for the Shoalhaven Open Coastline and Jervis Bay, in line with the NSW Coastal Management Framework.

The CMP comprises a program of integrated management actions that are intended to address key issues, and harness new opportunities. It outlines specific actions that are to be implemented over a forward 10-year management timeframe. In doing so, the CMP seeks to achieve the objects of the *Coastal Management Act 2016* (CM Act), and preserve the social, cultural, economic, and environmental values of the coastal zone.

This program has been developed in accordance with the staged process for developing and implementing a CMP, as detailed in the NSW Coastal Management Manual (OEH, 2018a) (Figure EX-1). The completed stages supporting this CMP include the preparation of:

- **Stage 1: Shoalhaven Coastal Management Program Scoping Study** (Advisian, 2020): This included a review of relevant background information, a first pass risk assessment, a data gap analysis, and formulation of a plan for the development of the suite of CMPs covering the Shoalhaven's coastline and estuaries.
- **Stage 2: Shoalhaven Open Coast and Jervis Bay CMP Stage 2 – Risks, Vulnerabilities and Opportunities** (Water Technology, 2023a): This included a detailed assessment of the various threats and risks affecting the environmental, social, cultural, and economic assets and values of the coastline.
- **Stage 3: Shoalhaven Open Coast and Jervis Bay CMP Stage 3 Summary Report** (Water Technology, 2023b): This included stakeholder engagement and options analysis in order to identify and prioritise coastal management actions that can effectively address issues and risks, take advantage of new opportunities, and give effect to the objectives of the CM Act.

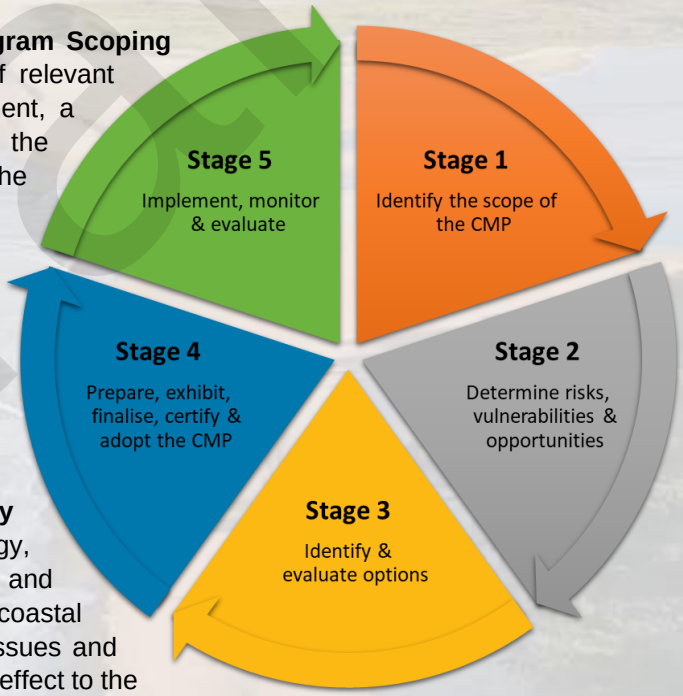

Figure EX-1 The CMP process

This document has been prepared on behalf of Shoalhaven City Council (Council), with funding and technical support from the NSW Department of Planning and Environment (DPE), and in consultation with various state agencies and other relevant stakeholders.

Study Area

The CMP covers and applies to the coastal zone of the Shoalhaven Open Coast and Jervis Bay – as legally defined in the CM Act and the State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) and shown in Figure EX-2. This stunning coastline stretches over 165 km, from Shoalhaven Heads in the

north, to North Durras Beach in the south, and also includes Jervis Bay – see Figure EX-2. To ensure a consistent management approach across the entire LGA open coast, the study area of this CMP covers the full extent of the open coastline within the Shoalhaven LGA, exclusive of the Jervis Bay Territory.

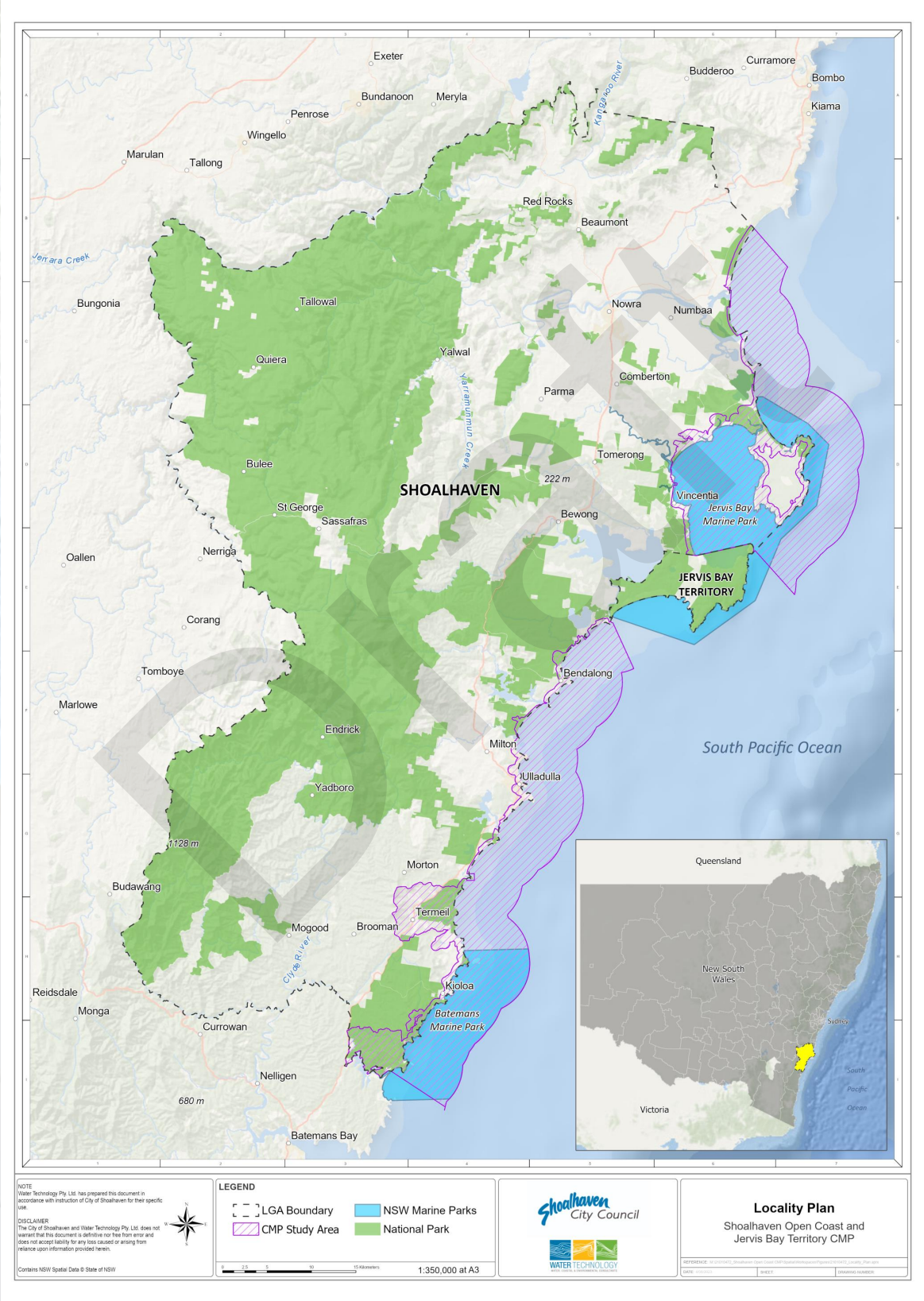

Figure EX-2 The Shoalhaven and Jervis Bay Coastal Management Plan Study Extent

The Shoalhaven LGA is one of the most biologically diverse regions in the NSW. The study area supports biodiversity that is important from national, state, regional, and local perspectives – and the unique topography and geography provide the setting for a diverse range of terrestrial and marine ecosystems.

Furthermore, the coastal zone of Shoalhaven LGA supports activities such as tourism, which forms a substantial portion of the local economy. As a primary tourism destination in NSW, the summer population of coastal villages peak at double or triple their normal amount. In recent years, the Shoalhaven LGA has seen significant increases in day trip visitors to its coast and tourism outside of peak season has increased by 40% (Advisian, 2020).

The Shoalhaven LGA has a rich and continuing Indigenous heritage, with cultural history that goes back 60,000 years. Cultural heritage values of the area are dynamic and includes both tangible and intangible elements. Indigenous cultural heritage sites include men's and women's sites; initiation grounds; corroboree grounds; landscape creation stories; and named places.

Vision, Purpose, and Objectives for the CMP

A local vision statement has been developed for the CMP to help stakeholders identify with the future of the coastline, and foster commitment to its implementation. The Vision for the CMP is:

"We care for and protect the coast in a responsible manner so that current & future generations continue to be refreshed & inspired by their coastal experience."

The purpose statement further refines the vision by specifying the intended function and role of CMP:

"To develop a plan for the future management of the Shoalhaven's open coastline in a manner consistent with the principles of ecologically sustainable development for the social, cultural, and economic well-being and safety of the people of the Shoalhaven."

A suite of objectives has been developed for the CMP, in order to ensure that the program recognises and protects the environmental, social, cultural, and economic values of the study area. These objectives have been developed ensuring consistency and alignment with a range of local, regional, and state policies and plans – including the CM Act.

Snapshot of Issues

The various issues, vulnerabilities, and opportunities affecting the Shoalhaven Open Coast and Jervis Bay were initially assessed as part of the First Pass Risk Assessment in Stage 1 (Advisian, 2020). This was further refined in Stage 2 (Water Technology, 2023a), and included an updated and detailed risk assessment of coastal hazards. This involved identifying and assessing risks and benefits to environmental, social, and economic values across the coastline, with the aim of informing the development of management options in Stages 3 and 4.

Key issues influencing coastal management are summarised in Figure EX-3, and include:

- Coastal hazard risks to land, property, assets and infrastructure – including risks posed by the coastal hazards defined in the CM Act. The Shoalhaven LGA coastline has a long history of experiencing severe coastal hazard impacts, with the greatest impacts felt by coastal erosion and coastal inundation generated by East Coast Lows (ECLs).
- Social, cultural, and environmental risks: These include risks to environmental values and biodiversity, social and recreational amenity (and public safety), as well as risks to both tangible and intangible cultural heritage values.

As required by the CM Act, the key risks and threats have been considered over a range of timeframes, including the present day, as well as future planning horizons 20 years, 50 years, and 100 years - in order to account for future climate changes impacts, and the impacts of population growth and future development on the coastal zone. The nature and severity of these risks varies widely across the study area, and therefore in order to adequately inform the derivation and assessment of management options, these risks were assessed at a local level on a beach-by-beach basis.

Coastal hazards addressed in this CMP

 **(1) Beach erosion**	 **(2) Shoreline recession**	 **(3) Coastal lake or watercourse entrance instability**
 **(4) Coastal cliff/slope instability**	 **(5) Coastal inundation**	 **(6) Tidal inundation**

Key Environmental, Social and Cultural Risks addressed in this CMP

Environmental		Social (Public Safety and Amenity)		Cultural	
	Weeds and invasive species		Coastal hazard impacts on public safety		Tangible & intangible Aboriginal Cultural Heritage (ACH) protection
	Vegetation vandalism		Coastal hazard impacts on safe & sustainable beach access		Community & visitor education & awareness of ACH values
	Recreational use impacts on dunes		Ensuring safe boating access to coastal waters		Increasing First Nations participation in management of coastal country
	Climate change impacts on habitats and biodiversity		Maintenance of recreational amenity		
	Population growth & coastal development impacts on biodiversity		Population growth impacts on social & recreational amenity		

Figure EX-3 Key risks addressed in this CMP

Stakeholder and Community Engagement

A detailed Stakeholder and Community Engagement Strategy was developed as part of the CMP, outlining the timing, content, and engagement methods to be utilised for all community and stakeholder engagement activities (Advisian, 2020). This strategy has been implemented progressively through each stage of the CMP, with a summary of activities provided in Figure EX-4. This engagement strategy was developed in line with CMP Engagement Guidelines (OEH, 2018d), the Shoalhaven City Council Community Engagement Strategy (Shoalhaven City Council, 2023a), and the use of the International Association for Public Participation (IAP2) guidelines. This included engagement with Traditional Owner Groups, local communities, and public authorities through a range of methods – including workshops, drop-in sessions, surveys and 1 on 1 meetings.



Figure EX-4 Snapshot of CMP engagement process

Management Strategies and Actions

One of the key objectives of the CMP process is to facilitate a coordinated approach to address issues and risks. With this in mind, this CMP has attempted to the greatest extent possible to develop a program of management actions that is highly integrated, and which can be enacted through an achievable and coordinated implementation schedule.

In Stage 3 of the CMP, management actions were identified and prioritised through stakeholder and community engagement, expert professional analysis and insight, and a review of the historical management of the coastline. Based on this assessment, a total of 116 actions have been included in the program.

The CMP actions have been structured to better facilitate a large scale, coordinated approach to coastal management, whilst maintaining specific focus and granularity at a local level. The actions are therefore comprised of 7 overarching strategies for managing the entire LGA coastline, and 4 local area plans (LAPs) that focus on discrete actions at a local beach level in order to manage localised coastal risks and threats – as depicted in Figure EX-5.



Figure EX-5 The structure of this CMP – comprising 7 strategies for managing the entire coastline, and 4 local area action plans

For each action, this CMP provides a summary of the tasks involved, roles and responsibilities, costs, and timeframes for delivery, and well as objectives and performance indicators.

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

Business Plan

A Business Plan has been developed 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 is estimated to cost $45 Million (2023 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 competitive State Government grant programs, Council's internal funds, and local third parties.

Implementation and Review

This CMP is considered a 'living document' that is to be reviewed and updated over time. A strategic review of the CMP should occur at least once every ten years to assess the effectiveness of the CMP in achieving its objectives and to incorporate changes in light of new information, legislative and policy changes, and improved understanding of the local coastal processes.

CONTENTS

1	INTRODUCTION	1
1.1	Purpose of this Coastal Management Program	1
1.2	Area Covered by this CMP	1
1.3	Vision, Purpose, and Objectives	6
1.4	The NSW Coastal Management Framework	8
1.5	Roles and Responsibilities across the Coastal Zone	10
2	SNAPSHOT OF ISSUES	19
2.1	Overview	19
2.2	Coastal Hazards	20
2.3	Environmental, Social, and Cultural Risks	31
3	STAKEHOLDER AND COMMUNITY ENGAGEMENT	38
3.1	CMP Engagement Overview	38
3.2	Stage 1	39
3.3	Stages 2 and 3	39
3.4	Stage 4	45
4	ACTIONS TO BE IMPLEMENTED BY COUNCIL OR BY PUBLIC AUTHORITIES	46
4.1	Selection of Management Actions	46
4.2	Overview of Management Actions	53
4.3	Overarching Strategies for Coastal Management	56
4.4	Local Area Plan: Northern LGA	65
4.5	Local Area Plan: Jervis Bay Area	71
4.6	Local Area Plan: Central LGA	80
4.7	Local Area Plan: Southern LGA	88
4.8	Actions to be Implemented by Public Authorities other than Council	95
4.9	Implementation of CMP Actions	96
5	WHETHER THE CMP IDENTIFIES RECOMMENDED CHANGES TO THE RELEVANT PLANNING CONTROLS, INCLUDING ANY PROPOSED MAPS	99
6	BUSINESS PLAN	100
6.1	The Benefits of Implementing the CMP	100
6.2	Potential Funding Mechanisms	100
6.3	Cost-Benefit Distribution	103
6.4	Implementation Plan	103
6.5	Council's LGA Wide CMP Action Implementation Plan	111
7	COASTAL ZONE EMERGENCY ACTION SUBPLAN	112
8	MONITORING, EVALUATION, AND REPORTING PROGRAM	113
8.1	Overview of the Monitoring and Evaluation Process	113
8.2	Component 1: Delivery of Management Actions	115
8.3	Component 2: Environmental Parameters and Indicators	115

Draft

8.4 Component 3: Achievement of Objects of the CMP and CM Act 116
9 MAPS 118
10 REFERENCES 119

APPENDICES

Appendix A Companion Mapping Set
Appendix B Coastal Zone Emergency Action Subplan
Appendix C Glossary of Terms and Abbreviations
Appendix D Alignment of CMP with Objectives of the CM Act and RH SEPP
Appendix E Beach Access Track Action Maps

LIST OF FIGURES

Figure EX-1 The CMP process iii
Figure EX-2 The Shoalhaven and Jervis Bay Coastal Management Plan Study Extent iv
Figure EX-3 Key risks addressed in this CMP vi
Figure EX-4 Snapshot of CMP engagement process vii
Figure EX-5 The structure of this CMP – comprising 7 strategies for managing the entire coastline, and local area action plans 4 viii
Figure 1-1 The area covered by this CMP 4
Figure 1-2 Coastal sediment compartments of the Shoalhaven LGA 5
Figure 1-3 The Vision, Purpose, and Objectives of the CMP 6
Figure 1-4 The NSW coastal management framework 9
Figure 1-5 The CMP process 10
Figure 1-6 NSW State Government agencies with coastal management roles 11
Figure 2-1 The Stage 1 Scoping Study and TARA 19
Figure 2-2 Shoalhaven Heads Beach showing Surf Club in 1977 (left) and following rock protection in 1978 (right). Image source: DPE. 20
Figure 2-3 The Callala Beach coastal erosion event of 1974. Image source: A. Gordon 20
Figure 2-4 Erosion at Currarong Beach after June 2016 ECL. Image source: DPE. 21
Figure 2-5 Revetment repair works (left) and beach scraping (right), after the June 2016 ECL. Image source: SCC. 21
Figure 2-6 Wave run-up and coastal inundation of a sewage pump station at Narrawallee Beach during the June 2016 ECL. Image source: SCC. 21
Figure 2-7 Shoalhaven Heads after the sequence 2021 ECL storm events. Image source: SCC 22
Figure 2-8 Emergency beach scraping works undertaken by Council after storm events. Left: Bendalong Boat Harbour, April 2022. Right: Mollymook Beach, June 2020. Image source: SCC 22
Figure 2-9 Beach scraping and dune rebuilding works undertaken by Council at Narrawallee Beach in June 2022. Image source: SCC 22
Figure 2-10 Left: Coastal slope instability event at Bannisters Point, Mollymook in August 2015. Right: Wave-cut cliff collapse at Hyams Point in 2022 (Douglas Partners, 2023) 23
Figure 2-11 Coastal cliff and slope instability event at Inyadda Point following heavy rainfall in December 2021. (Douglas Partners, 2023) 23
Figure 2-12 Overview of beach rotation 24
Figure 3-1 Snapshot of CMP engagement process 38

Draft

Figure 3-2 Functionality of the online engagement portal 40
Figure 3-3 A snapshot of the Feedback Portal (top) and Suggestion Portal (bottom) 41
Figure 3-4 Drop-in session attendees watching an introductory video at the Callala Beach Community Hall, 7 September2022. 43
Figure 3-5 Stage 3 stakeholder engagement process with state agencies 44
Figure 4-1 Four steps in action identification and evaluation (adapted from the CM Manual) 46
Figure 4-2 Identification of potential management options 47
Figure 4-3 The Stage 3 options assessment process (adapted from the CM Manual) 48
Figure 4-4 Calculation of feasibility score 50
Figure 4-5 Calculation of the options ranking score 53
Figure 4-6 The structure of this CMP – comprising 7 strategies for managing the entire coastline, and 4 local area action plans 54
Figure 4-7 Shoalhaven Heads in 2019. Image source: SLSC 66
Figure 4-8 Culburra Beach in 2023. Image source: Council 66
Figure 4-9 Warrain Beach in 2023. Image source: Council 66
Figure 4-10 Currarong Beach in 2021 66
Figure 4-11 LAP Action locations for Shoalhaven Heads 70
Figure 4-12 LAP Action locations for Currarong (left) and Culburra Beach / Crookhaven (right) 70
Figure 4-13 Callala Bay in 2023. Image source: CoastSnap 72
Figure 4-14 Callala Beach in 2021 72
Figure 4-15 Huskisson Beach in 2021 72
Figure 4-16 Collingwood Beach in 2022. Image source: Council 72
Figure 4-17 Nelsons Beach in 2023. Image source: CoastSnap 72
Figure 4-18 Hyams Beach in 2021 72
Figure 4-19 LAP Action locations for Callala Bay 78
Figure 4-20 LAP Action locations for Huskisson (left) and Callala Beach (right) 78
Figure 4-21 LAP Action locations for Collingwood Beach and Vincentia 79
Figure 4-22 LAP Action locations for Hyams Beach (left) and Vincentia (right) 79
Figure 4-23 Manyana Beach in 2021 81
Figure 4-24 Bendalong Harbour in 2023. Source: CoastSnap 81
Figure 4-25 Narrawallee Beach in 2023. Source: CoastSnap 81
Figure 4-26 Mollymook Beach in 2023. Source: CoastSnap 81
Figure 4-27 Collers Beach in 2021 81
Figure 4-28 Ulladulla Harbour in 2021 81
Figure 4-29 LAP Action locations for Bendalong South (left) and North (right) 86
Figure 4-30 LAP Action locations for Narrawallee Beach (left) and Manyana (right) 86
Figure 4-31 LAP Action locations for Mollymook Beach 87
Figure 4-32 LAP Action locations for Ulladulla Harbour (left) and Collers Beach (right) 87
Figure 4-33 Rennies Beach in 2023. Source: CoastSnap 89
Figure 4-34 Racecourse Beach in 2023. Source: CoastSnap 89
Figure 4-35 Wairo Beach in 2018. Source: SCC 89
Figure 4-36 Cormorant Beach in 2021 89
Figure 4-37 Kioloa Beach in 2021 89
Figure 4-38 Depot Beach in 2021 89
Figure 4-39 LAP Action locations for Bawley Point and Cormorant Beach 93

Draft

Figure 4-40 LAP Action locations for Merry Beach (left) and Kioloa Beach (right) 93
Figure 4-41 LAP Action locations for North Durras Beach (left) and Depot Beach (right) 94
Figure 4-42 Integrated Planning and Reporting Framework (Source: SCC Delivery Program Operational Plan & Budget 2023/24) 96
Figure 8-1 Overview of MER program for the CMP 114

LIST OF TABLES

Table 1-1 Coastal sediment compartments of the Shoalhaven LGA 3
Table 1-2 Strategic objectives of the CMP 7
Table 1-3 Specific objectives of the CMP 7
Table 2-1 Coastal hazards listed under the CM Act 27
Table 2-2 Future SLR scenarios considered in this CMP 27
Table 2-3 Summary of coastal hazard risks to infrastructure 28
Table 2-4 Key environmental, social and cultural risks and opportunities 32
Table 2-5 Risk assessment outcomes for Environmental, Social, and Cultural risks (from Stage 2 Report) 33
Table 3-1 Summary of online portal responses 42
Table 3-2 Summary of community drop-in sessions 42
Table 4-1 Calculation of acceptability score 51
Table 4-2 Viability score weighting for options 52
Table 4-3 The Action Priority Matrix 56
Table 4-4 Overarching strategies and actions for Coastal Management 58
Table 4-5 Northen LGA LAP 67
Table 4-6 Jervis Bay Area LAP 73
Table 4-7 Central LGA LAP 82
Table 4-8 Southern LGA LAP 90
Table 4-9 Relationship between the IP&R Framework and the CMP 97
Table 4-10 Actions pertaining to local studies and feasibility investigations 98
Table 6-1 Summary of potential funding sources of the CMP 101
Table 6-2 Legend for Funding Sources in Table 6-3. 103
Table 6-3 Business Plan for the CMP 105

Draft

1 INTRODUCTION

1.1 Purpose of this Coastal Management Program

The purpose of this Coastal Management Program (CMP) is to establish an integrated program for the coordinated management of the Shoalhaven Open Coast and Jervis Bay.

The CMP provides strategic direction, and a program of integrated management actions that are intended to achieve the objects of the *Coastal Management Act 2016* (CM Act), and preserve the environmental, social, and economic values of the coastal zone. It outlines specific actions that are to be implemented over a forward 10-year management timeframe and provides clear details for how actions will be implemented, funded, monitored, and reviewed.

This CMP aims to address the various risks, threats, and opportunities across the coastal zone over a range of timeframes (immediate, 20 years, 50 years, 100 years), as required by the CM Act. Longer-term pressures such as climate change and population growth have been considered in the formulation of management actions, to ensure resilience against future threats and the conservation of the values of the coastline for future generations.

The Shoalhaven Open Coast and Jervis Bay CMP has been prepared in accordance with the mandatory requirements for CMPs specified in the CM Act, and the NSW Coastal Management Manual (OEH, 2018e) (hereby referred to as the CM Manual). This document has been prepared on behalf of Shoalhaven City Council (Council) with funding and technical support from the NSW Department of Planning and Environment (DPE), and in consultation with various state agencies and other relevant stakeholders.

Under the NSW Coastal Management Framework, this CMP supersedes the previous Shoalhaven Coastal Zone Management Plan (CZMP), which was developed under the previous coastal management framework (and the *Coastal Protection Act 1979*) and certified by the Minister for the Environment in September 2018 (Shoalhaven City Council, 2018).

1.2 Area Covered by this CMP

1.2.1 CMP Study Area

The Shoalhaven Local Government Area (LGA) coastal zone comprises over 165 km of open coastline which extends from Shoalhaven Heads in the north, to North Durras Beach in the south, and also includes Jervis Bay. To ensure a consistent management approach across the entire LGA open coast, the study area of this CMP covers the full extent of the open coastline within the Shoalhaven LGA. This CMP only applies to areas within the mapped coastal zone. A map of the CMP study area is provided in Figure 1-1 below.

It should be noted that the study area for the CMP does not include the Jervis Bay Territory (which includes Booderee National Park), which is a Commonwealth-administered territory occupying the Bherwerre Peninsula and forming the southern boundary of Jervis Bay.

A companion mapping set depicting the study area in detail, including key beaches, headlands, coastal features and major townships is provided in Appendix A.

1.2.2 Overview of the Shoalhaven LGA Suite of CMPs, and rationale for this CMP

Whilst this CMP sets out a management program for Open Coastline and Jervis Bay – it is important to note that this is only one of several CMPs to be implemented by Council. In order to effectively manage its coastal zone, Council has determined to undertake a suite of discrete, but interlinked CMPs that collectively cover the

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coastal zone of its LGA, including coastal estuaries and creeks. As of November 2023, the existing suite of CMPs under development include:

- The Lower Shoalhaven River CMP.
- The Lake Conjola CMP
- The Sussex Inlet, St. Georges Basin, Swan Lake, and Berrara Creek CMP.

Future CMPs will be initiated for Lake Wollumboola, Burrill Lake, Lake Tabourie, Lake Willinga, Currambene Creek and the Shoalhaven Urban and Rural Estuaries.

When determining the optimal spatial scale of a CMP, it is important to consider the need to balance the required level of detail, with desired level of management efficiency. A single CMP that covers the entirety of the Shoalhaven LGA coastal zone (including the entire coastline and all estuaries) would be so large in scale that it would lack the detail required to adequately address smaller, localised issues. Alternatively, the preparation of a CMP for each individual estuary and/or coastal compartment would result in Council having to prepare and implement more than a dozen CMPs. This would result in an inefficient process that is unwieldy and overly complicated to implement. Furthermore, smaller scale CMPs may lack the ability to effectively address larger scale issues, or issues that are common across various parts of the coastal zone.

Therefore, the current suite of CMPs is intended to strike a practical balance for effective management. It has been developed with a strong consideration to the performance of historical management plans, the prevailing coastal zone issues, and relevant stakeholder groups.

1.2.3 Coastal Management Areas

In accordance with the CM Act, this CMP gives effect to the management objectives for the 4 coastal management areas (CMAs) that define the coastal zone of the study area. Each CMA has different characteristics and objectives, and the areas may overlap. The CM Act provides the definition and objectives for each of the management areas. The State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) provides development controls for each of the management areas, and state-wide mapping of 3 of the 4 areas. The 4 coastal management areas as defined by the CM Act are:

- **Coastal environment area (CEA):** Land containing coastal features such as the coastal waters of the state, estuaries, coastal lakes, coastal lagoons, and land adjoining those features including headlands and rock platforms. Beaches, dunes, and foreshores are included in this area.
- **Coastal use area (CUA)**: Land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (at present or in the future) and impacts of development on the scenic and cultural values and use and enjoyment of the beaches, foreshores, dunes, headlands, rock platforms, estuaries, lakes and the ocean need to be considered.
- **Coastal wetlands and littoral rainforests area (CWLR)**: Land which displays the hydrological and floristic characteristics of coastal wetlands or littoral rainforests, as well as a surrounding proximity area to manage impacts of adjacent development.
- **Coastal vulnerability area (CVA)**: Land which is subject to any of the coastal hazards listed in the CM Act, including beach erosion, shoreline recession, coastal lake or watercourse entrance instability, coastal inundation, tidal inundation, coastal cliff or slope instability. Mapping for the coastal vulnerability area has not been provided from the RH SEPP, and no such coastal vulnerability area (CVA) map yet exists for the study area. Nonetheless, it is recognised that the Shoalhaven Open Coast and Jervis Bay are subject to coastal hazards and that the scope of this CMP also covers managing coastal vulnerability. The Open Coast and Jervis Bay are subject to coastal hazards including foreshore erosion, tidal inundation (otherwise termed “sunny day flooding”), storm tide inundation and coastal cliff or slope instability.

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The study area for the CMP therefore comprises the envelope extent of these CMAs along the open coastline. Detailed mapping of the study area and relevant CMAs is provided in the companion mapping set in Appendix A.

1.2.4 Coastal Sediment Compartments

Carvallo and Woodroffe (2015) have undertaken a study of the coastal compartments of the eastern coast of NSW. They considered sediment compartments as subdivisions of the coast separated by major obstacles such as headlands, which intercept and affect the longshore transport of sediment. The Shoalhaven coastal zone spans across 2 primary sediment compartments and 7 secondary sediment compartments as defined in the CM Act, noting the secondary and tertiary sediment compartments may be of greater relevance for management considerations for this CMP. These compartments are listed in Table 1-1 and mapped in Figure 1-2.

Table 1-1 Coastal sediment compartments of the Shoalhaven LGA

Primary	Secondary	Coastline Covered
Illawarra	Shoalhaven River	Black Head to Beecroft Head
Shoalhaven	Beecroft Peninsula	Beecroft Head to Point Perpendicular
	Jervis Bay	Jervis Bay, from Point Perpendicular to Cape St George
	St Georges Head	Cape St George to St Georges Head
	Wreck Bay	St Georges Head to Bendalong Point
	Narrawallee	Bendalong Point to Warden Head
	Lake Tabourie Coast	Warden Head to Wasp Head

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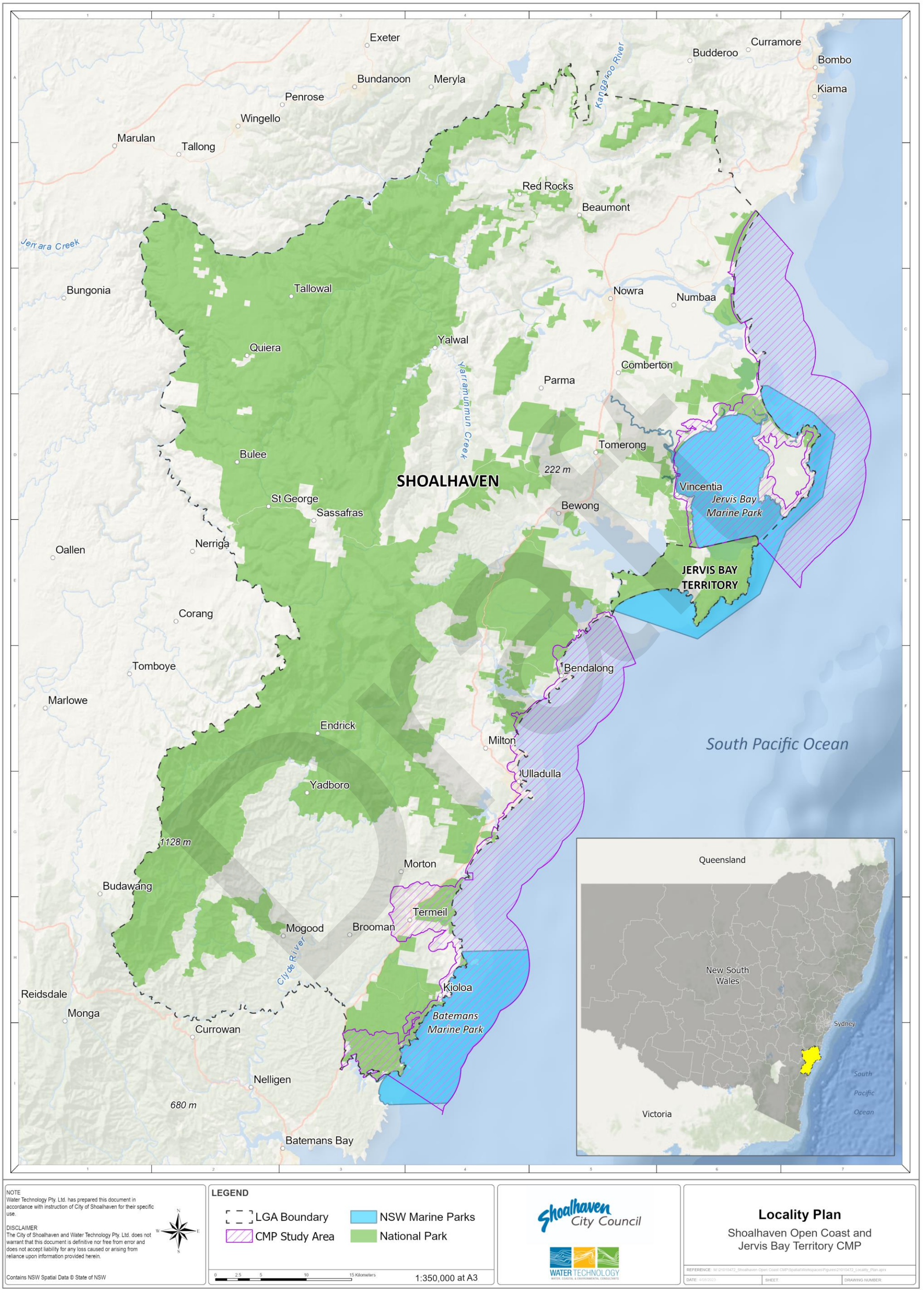

Figure 1-1 The area covered by this CMP

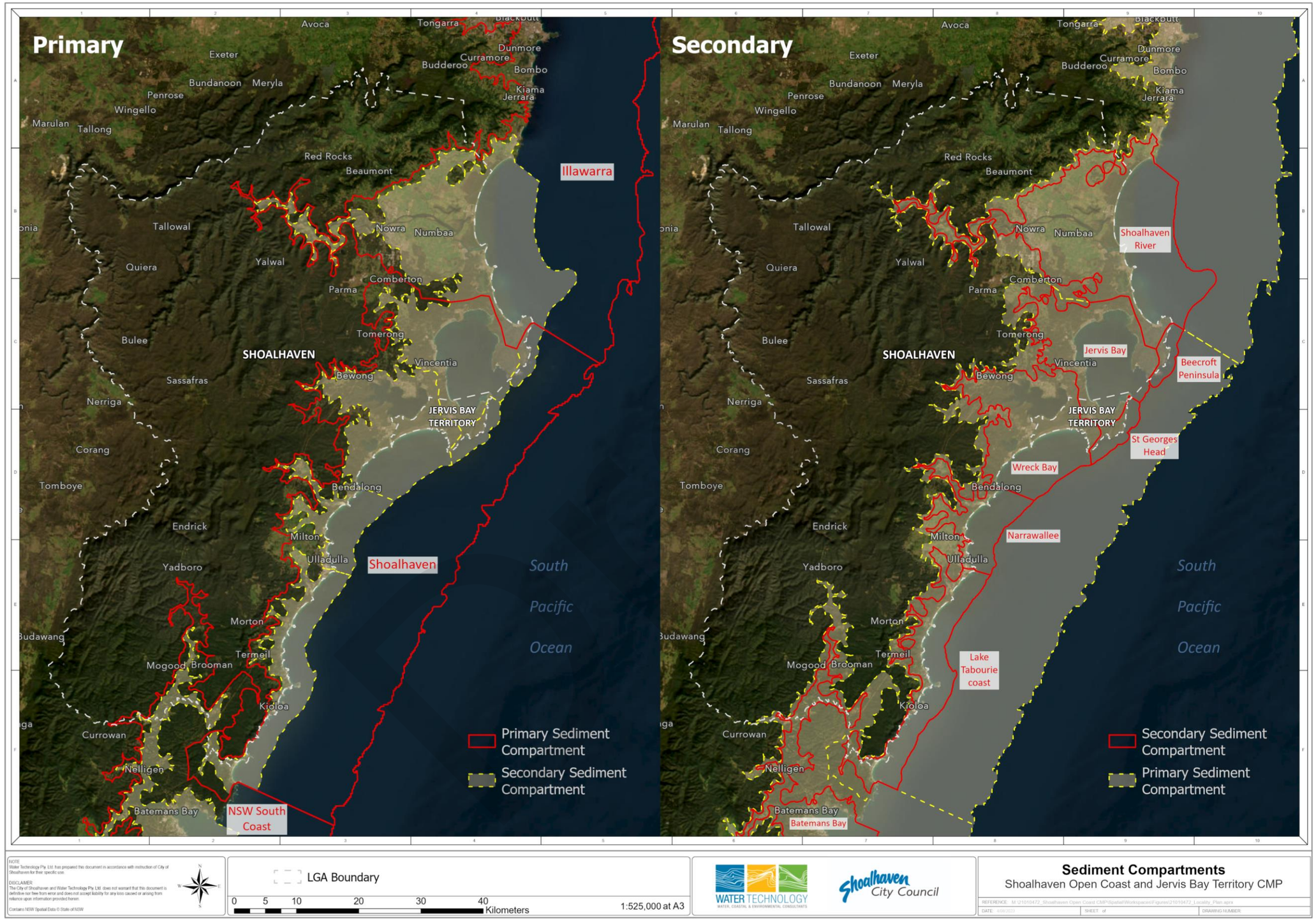

Figure 1-2 Coastal sediment compartments of the Shoalhaven LGA

1.3 Vision, Purpose, and Objectives

1.3.1 Overview

The purpose of the CMP is to create a comprehensive framework for the future management of the Shoalhaven LGA's coastline. This framework aligns with the principles of ecologically sustainable development and promotes the well-being of the community in social, cultural, and economic aspects.

During Stage 1 of the CMP (Advisian, 2020), Council developed a Vision, Purpose, and Management Objectives for the project. The Vision and Purpose play a crucial role in the CMP hierarchy, as they provide the framework for defining strategic objectives. These strategic objectives, in turn, enable the establishment of specific objectives. The relationship between the vision, purpose, and objectives is illustrated in Figure 1-3.

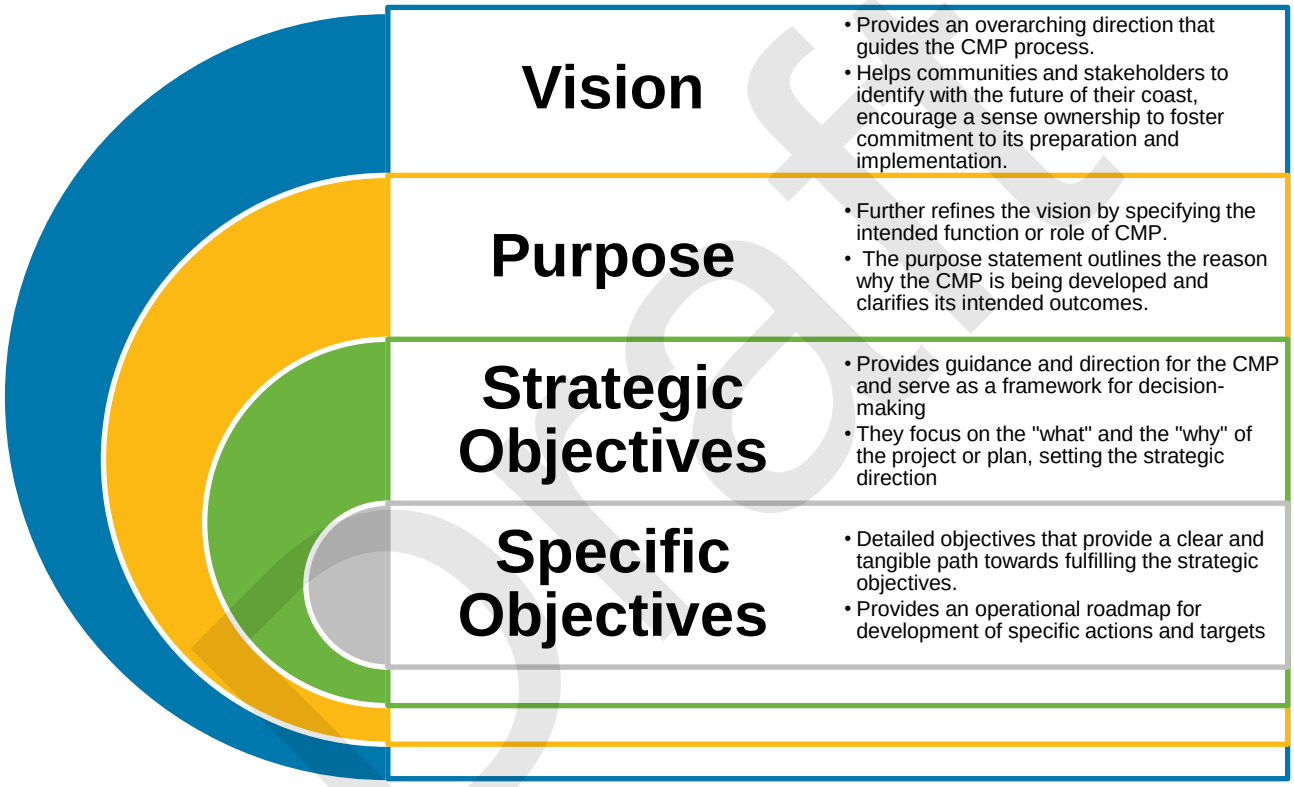

Figure 1-3 The Vision, Purpose, and Objectives of the CMP

1.3.2 Vision

The vision statement derived in Stage 1 of the CMP (Advisian, 2020) provides an overarching direction that guides the CMP process:

We care for and protect the coast in a responsible manner so that current & future generations continue to be refreshed & inspired by their coastal experience.

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1.3.3 Purpose

The purpose statement further refines the vision by specifying the intended function or role of CMP:

To develop a plan for the future management of the Shoalhaven's open coastline in a manner consistent with the principles of ecologically sustainable development for the social, cultural, and economic well-being and safety of the people of the Shoalhaven.

1.3.4 Strategic Objectives

The strategic management objectives determined during Stage 1 of the CMP are summarised in Table 1-2, with the key themes highlighted in **bold**.

Table 1-2 Strategic objectives of the CMP

Objectives
Give effect to all relevant **NSW legislation and policy**, as applied to the coastal zone, in the Shoalhaven context.
Manage all coastal systems in an **integrated manner that recognises the links** between catchment, lake, estuary and open coast processes.
Manage the coastal zone **adaptively**, with a clear process for **modifying management approaches** as new knowledge becomes available.
Invest in effective and efficient strategies to achieve **positive natural, social, cultural and economic outcomes** within Council's responsibilities.
Take **coastal hazards** into account in Council's **land use planning**.
Maintain **natural systems and processes** to improve the **health and diversity** of natural systems.
Support the **social and economic wellbeing** of local **communities by maintaining safe access** to beaches and headlands and supporting recreational activities.
Align the Coastal Management Program with Local Environment Plan 2014, Development Control Plan 2014 and Integrated Strategic Plan.
Engage with the community in the review and preparation of coastal management programs.
Keep the **community informed** about coastal processes and management responses.

1.3.5 Specific Objectives

The specific management objectives determined during Stage 1 of the CMP are summarised in Table 1-3, with the key themes highlighted in **bold**.

Table 1-3 Specific objectives of the CMP

Objectives
To **protect** and enhance natural **coastal processes** and **coastal environmental values** including natural character, scenic value, biological diversity and ecosystem integrity and resilience.

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Objectives
To support the **social and cultural values** of the coastal zone and maintain public access, amenity, use and safety.
To **acknowledge and protect Aboriginal peoples'** spiritual, social, customary and economic use of the coastal zone.
To recognise the coastal zone as a vital **economic** zone and support sustainable coastal economies.
To facilitate **ecologically sustainable development** in the coastal zone and promote sustainable land use planning decision-making.
To **mitigate current and future risks** from coastal hazards, taking into account the effects of **climate change**.
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.
To promote **integrated** and co-ordinated coastal planning, management, reporting and response.

1.4 The NSW Coastal Management Framework

1.4.1 The Framework

The NSW coast provides a multitude of values and uses for the community. However, the coastal zone is under increasing pressure from a growing population, urbanisation, natural hazards, and climate change (OEH, 2018b). Planning for coastal communities must carefully balance the need to provide jobs, housing, community facilities and transport for a changing population, while maintaining the unique qualities and managing risks associated with development along the State's coastlines (DPIE, 2019).

Sustainable management of the coastal zone often involves local 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, 2018b).

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

Key components of the framework include:

- ***Coastal Management Act 2016*** **(CM Act):** An act that provides for the integrated management of the coastal environment of NSW, consistent with the principles of ecologically sustainable development, for the social, cultural, and economic wellbeing of the people of the state.
- ***Marine Estate Management Act 2014*** **(MEM Act):** An act that provides for the management of the marine estate of NSW in a manner that promotes a biologically diverse, healthy and productive marine estate and which facilitates the economic cultural, social and recreational use of the marine estate, scientific research, education and management of marine parks.
- ***The NSW Environmental Planning and Assessment Act 1979*** **(EP&A Act)**: An act that governs land use planning and development in NSW, focusing on sustainable development, environmental protection, community participation, and compliance measures.
- **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.

- **Coastal Management Programs (CMPs):** A 5 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:** It 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:** It provides technical and financial support to local government to help manage the coastal zone.

A schematic of the NSW Coastal Management Framework is provided in Figure 1-4.



Figure 1-4 The NSW coastal management framework

1.4.2 Coastal Management Programs

The purpose of a CMP is to set the long-term strategy for the coordinated management of the coastal zone of a given area. It should focus on achieving coastal management objectives at a local level, whilst also achieving the broader objects of the CM Act. A CMP provides an opportunity for councils, public authorities and local communities to clearly identify and balance competing interests and priorities in the coastal zone.

A CMP is prepared through a five-stage risk management process as described in the CM Manual and depicted in Figure 1-5. This process is intended to help councils and their communities to identify and manage risks to the environmental, social, and economic values of the coast (OEH, 2018b). The CM Manual sets forth mandatory requirements for CMPs, and provides guidance regarding their preparation, development, adoption, implementation, and review.

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).

Under the Coastal Management framework, the council may (or must do so if directed by the Minister) prepare a CMP, or a series of CMPs, for its coastline and coastal estuaries.

1.4.3 Development of this CMP

As per the requirements of the CM Manual (OEH, 2018b; OEH, 2018c; OEH, 2018d; OEH, 2018e; OEH, 2018f), this CMP has been developed in a staged approach. A brief summary of these reports is provided below, and the reader is directed to those documents for further information.

- **Stage 1: Shoalhaven CMP Scoping Study** (Advisian, 2020): Stage 1 included a review of relevant background information, a first pass risk assessment, a data gap analysis, and a forward program for the CMP. This report was finalised in 2020.
- **Stage 2: Shoalhaven Open Coast and Jervis Bay CMP Stage 2 Summary Report** (Water Technology, 2023a): Stage 2 included a detailed assessment the various threats and risks affecting the environmental, social, and economic assets and values of the coastal zone.
- **Stage 3: Shoalhaven Open Coast and Jervis Bay CMP Stage 3 Summary Report** (Water Technology, 2023b)*:* Stage 3 included community and stakeholder engagement and an options analysis in order to identify and prioritise coastal management actions that can effectively address threats and risks, take advantage of opportunities, and give effect to the objectives of the CM Act.

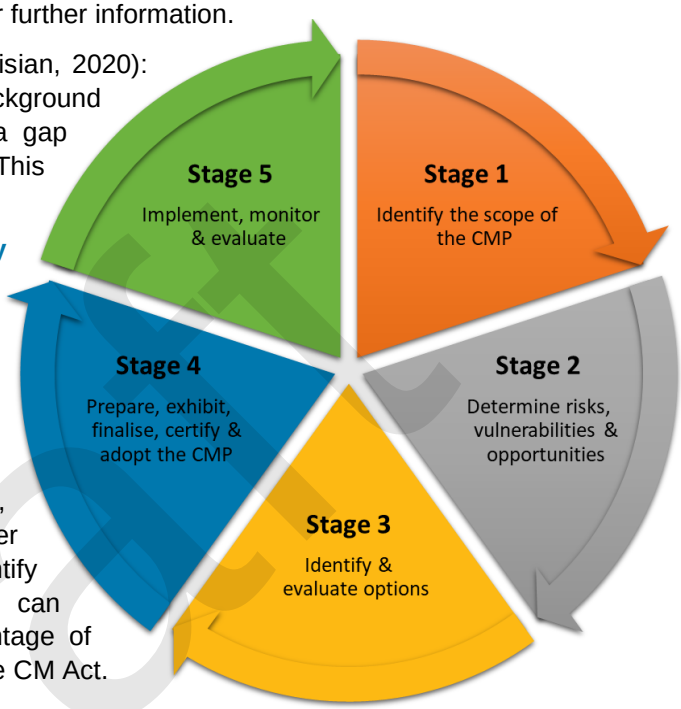

Figure 1-5 The CMP process

A number of previous studies have supported the preparation of this CMP, in addition to the above companion documents. This has included historical studies and plans prepared under the previous coastal management framework (refer to the Coastal Zone Management Plan (Shoalhaven City Council, 2018) prepared under the *Coastal Protection Act 1979*).

1.5 Roles and Responsibilities across the Coastal Zone

1.5.1 Governance Context

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

1.5.1.1 Local Government

Council has a central role in managing the coastal zone. Council responsibilities generally relate to management of coastal issues, coastal zone land and assets, and strategic planning. Council is responsible for preparation of a suite of CMPs that set out the long-term strategy for management of the coastal zone in its LGA.

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Section 355 of the LG Act makes provision for some council functions to be exercised by a committee. Subsequently, Council has established a number of committees, with all involving community members. There are 3 CMP Advisory Committees:

- **Northern CMP Advisory Committee** – covers all Council managed beaches from Seven Mile/Berry Beach at the northern coastal boundary to the southern end of Warrain/Currarong Beach.
- **Central CMP Advisory Committee** – covers all Council managed beaches from Callala Bay in the north, to Cunjurong Point in the south.
- **Southern CMP Advisory Committee** – covers all Council managed beaches from Lake Conjola entrance in the north, to the southern boundary of North Durras Beach.

The purpose of the Committees is to assist Council in the development and implementation of their suite of CMPs. They also provide advice and feedback to Council that represents the broad stakeholder interest of the Shoalhaven LGA's coastal zone. The Committees are comprised of Council representatives, community stakeholder groups and representatives of a number of state government agencies (Shoalhaven City Council, 2020), including:

- Appointed Chair (Councillor)
- Elected members of Council
- Chief Executive Officer or nominee
- Community representatives
- Local Aboriginal Land Council (LALC) representatives
- Department of Planning and Environment (DPE) representatives
- Transport for NSW (TfNSW) representatives
- New South Wales State Emergency Service (NSW SES) representatives
- Other relevant government agency representatives

1.5.1.2 State Government

There are over fifteen (15) state government agencies with management roles and responsibilities across the study area that are relevant to the CMP. These agencies are spread across 4 separate state government departments (or clusters). These agencies and their position within the wider NSW state government organisational structure are depicted in Figure 1-6. Some of these agencies have a land and asset management role, whilst others are issues based. A brief summary of the roles and responsibilities of the most relevant state government departments and agencies is provided herein.

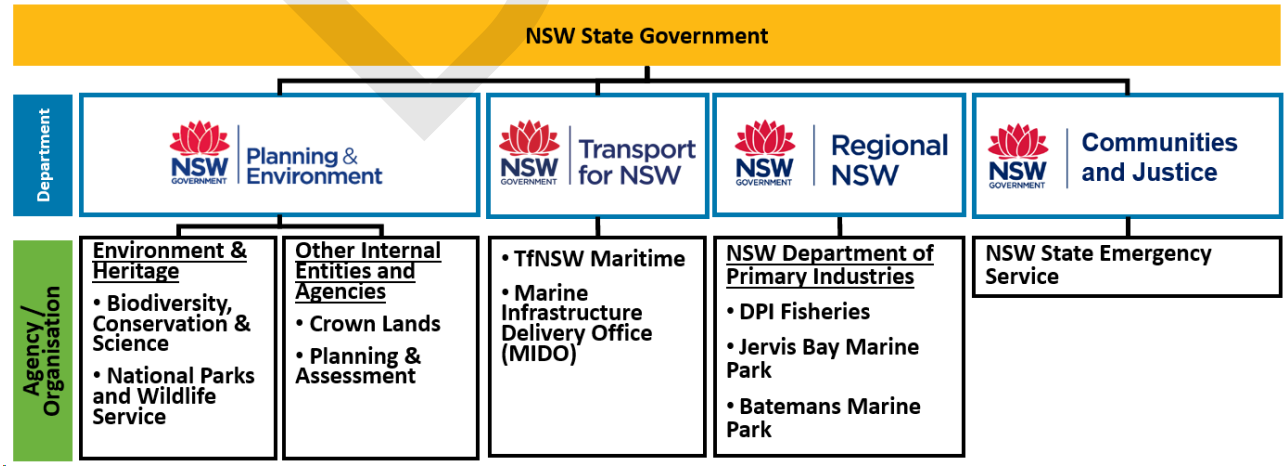

Figure 1-6 NSW State Government agencies with coastal management roles

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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 DPE, Department Primary Industries (DPI) Fisheries, and TfNSW (MEMA, 2019).

Many of these CMP stakeholder organisations are positioned within DPE, and their responsibilities across the study area relate to land and asset management, issues management, and planning and assessment. Within DPE, the **Environment and Heritage Group** (E&H), has absorbed the responsibilities of the former Office of Environment and Heritage (OEH). DPE (E&H) is responsible for administering the CM Act and provides oversight of the State's coastal management program. Within the DPE (E&H) organisation structure, the Biodiversity Conservation and Science Directorate provides oversight in the development of each council's CMPs and provides data and technical advice as needed. It also administers the Coastal and Estuary Grants Program that provides funding for councils to prepare and implement their CMPs.

Within the DPE (E&H) organisation structure, lies the **NSW National Parks and Wildlife Service** (NPWS), which is responsible for management of the *National Parks and Wildlife Act 1974* and management of national parks and reserves across the study area. NPWS responsibilities across the study area includes a wide range of activities, such as active conservation and habitat protection, fire management, management of tourism and visitation, research, and education. It is also responsible for management and protection of Aboriginal cultural heritage and European heritage across its land tenure.

The DPE – **Crown Lands** (Crown Lands) is responsible for the administration and / or management of Crown land under the *Crown Land Management Act 2016*. Crown lands includes submerged Crown land, seabed and subsoil to 3 nautical miles from the coastline of NSW that is within the limits of the coastal waters of the State.

The **Transport for NSW** (TfNSW) cluster is comprised of an extended network of agencies. TfNSW sets the strategic direction for transport and works in partnership with government transport operating agencies and private service providers to deliver improved transport outcomes for the community and economy of NSW.

Maritime sits within TfNSW as the state's maritime safety regulator for commercial and recreational vessels and their operators. Maritime's role within TfNSW is to promote safe, responsible, and sustainable use of waterways, including but not limited to the enforcement of safe on-water vessel practices, the administration of recreational vessel licenses and vessel registrations, and provision of guidance for safe navigation.

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, wharves and pontoons across the study area (noting that most boat ramps are generally owned and managed by local councils).

The **Maritime Infrastructure Delivery Office** (MIDO) sits within Maritime and is a joint initiative between the former agencies of Roads and Maritime Services and the Department of Industry to improve the coordination and delivery of coastal and boating infrastructure programs and projects across NSW that support recreational boating, fishing, tourism and a range of other commercial activities. MIDO is responsible for delivering key projects and programs including programs administered by TfNSW for boating infrastructure, DPE's Coastal

Infrastructure Program, and a number of major projects including the La Perouse to Kurnell Ferry Wharf and Eden Safe Harbour projects.

Department of Primary Industries – Fisheries (DPI Fisheries) is part of the Department of Regional NSW, and is responsible for administering the *Fisheries Management Act 1994* and ensures decisions made about land management and development avoids and minimises impacts on fisheries resources. Its responsibilities also include the licensing of recreational fishers, enforcement of bag limits, and permits for commercial fishing activities. It is responsible for threatened species conservation and marine vegetation protection (including mangroves, saltmarsh and seagrass) across the waterways of the study area. Fisheries also administer the MEM Act in coordination with the NSW Marine Estate Management Authority (MEMA). DPI Fisheries is also responsible for the management of Jervis Bay Marine Park (JBMP) and Batemans Marine Park (BMP), including administering permit requirements for all organised, commercial and habitat activities that occur anywhere within the marine parks and providing advice to minimise any impact from development in their catchments.

The **NSW State Emergency Service** sits within the Department of Communities and Justice, with the major responsibilities of provision of emergency and rescue during times of natural hazard emergencies and disasters – including flooding, storms (including storm tide and severe erosion events). This also includes management of tsunami events as per the NSW State Tsunami Plan (NSW SES, 2018).

1.5.1.3 Traditional Owner Groups

The Shoalhaven Region has a rich and continuing Indigenous heritage, with cultural history that goes back 60,000 years and continuing today.

There are a number of active Local Aboriginal Land Councils (LALCs) across the Shoalhaven LGA. 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. The two LALCs across the Shoalhaven LGA include:

- Ulladulla LALC
- Jerrinja LALC

The Jerrinja Tribal Group is also active across the Shoalhaven LGA and play a significant role in various aspects of their communities' lives, culture, and governance.

Furthermore, the Nowra LALC are also active across the inland regions of the LGA, though its boundaries do not extend to the coastline nor this study area of this CMP.

1.5.1.4 Community Groups

There are a number of other non-governmental organisations (NGOs) that operate across the study area. These organisations include educational institutions, industry groups, and community and resident groups and

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businesses. There are a number of active community consultative bodies (CCBs) and community groups across the study area, including (but not limited to) the following:

- Bawley Point, Kioloa & Termeil Community Association
- Birdlife Shoalhaven
- Burrill Lake Community Association
- Callala Bay Community Association
- Callala Beach Progress Association
- Callala Foreshore Alliance
- Collingwood Beach Preservation Group
- Conjola Community Association
- Culburra Beach Seniors
- Culburra Beach Progress Association
- Currarong Community Association Inc
- Huskisson Woollamia Community Voice
- Hyams Beach Villagers Association
- Jervis Bay Cruising Yacht Club
- Jervis Bay Game Fishing Club
- Jervis Bay Sailing Club
- Lake Tabourie CCB
- Lake Wollumboola Protection Association
- Red Head Villages Association
- Shoalhaven Heads Community Forum
- Shoalhaven Heads SLSC
- Sussex Inlet & Districts Community Forum
- Tabourie Lake Ratepayers and Residents Association
- Ulladulla & Districts Community Forum Inc
- Vincentia Ratepayers and Residents Association

In addition to the CCBs listed above, the are also a range of active dune care and bush care groups across the LGA coastal zone. A full register of these groups is available on by Council's CCB database[1].

1.5.2 Statutory Context

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

Coastal Management Act 2016

The CM Act establishes the framework and sets forth the objectives for coastal management in NSW. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way for the social, cultural, and economic well-being of the people of NSW (DPIE, 2019a).

The CM Act lists a series of management objects that must be considered when developing a CMP (refer to Part 3 of the Act). There are also objectives provided for each of the 4 coastal management areas. The objectives in the CM Act have been considered and addressed in this CMP in the following ways:

- The Vision, and Objectives of this CMP are based on, and consistent with, the objectives set forth in the CM Act (see Section 1.3).
- Stage 1 of the CMP has considered the State and Regional policies and plans prescribed by the Act.
- Stage 2 of the CMP (Water Technology, 2023a) has assessed in detail the various coastal zone issues, and hazards outlined in the CM Act.

[1] https://www.shoalhaven.nsw.gov.au/Projects-Engagement/Community-Consultative-Bodies

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- Stage 3 of the CMP (Water Technology, 2023b) has involved a high level of consultation with the community and relevant stakeholders in order to develop a series of management actions intended to address these issues and risks in an integrated and strategic manner. In doing so, the suite of actions:
  - Promotes the objects of the Act.
  - Gives effect to the management objectives for the coastal management areas covered by the program.
- Stage 4 of the CMP has been developed in consistency with the statutory requirements of the Act, and the mandatory requirements set out in the CM Manual.

A more detailed summary of how this CMP supports the objects of the CM Act, and objectives for each coastal management area of the RH SEPP is provided in Appendix D.

State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) updates and consolidates into one integrated policy a series of previously enforced SEPPs, including: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan.

The RH SEPP streamlines coastal development assessment requirements, identifies development controls for consent authorities to apply to each coastal management area to achieve the objectives of the CM Act, and establishes the approval pathway for coastal protection works (DPIE, 2019).

State-wide mapping that accompanies the RH SEPP is available for the coastal wetlands and littoral rainforest area, the coastal environment area, and the coastal use area. The mapping of coastal vulnerability areas is undertaken as part of CMP development, based on either existing coastal hazard mapping, or mapping to be developed during Stage 2 of the CMP.

Marine Estate Management Act 2014

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

The objective of the MEM Act is to provide for strategic and integrated management of the NSW marine estate, including the marine waters, coasts, and estuaries. The MEM Act promotes a biologically diverse, healthy and productive marine estate, and facilitates the economic cultural, social and recreational use of the marine estate, scientific research, education and management of marine parks. The key legislative instruments under the MEM Act include:

- Marine Estate Management Regulation 2017.
- Marine Estate Management (Management Rules) Regulation 1999.

The NSW Marine Estate Management Strategy 2018-2028 was also developed and discussed further in Section 1.5.3.

As the study area includes both the Jervis Bay Marine Park and Batemans Marine Park, there are a number of special legislative protections and requirements that apply to the coastal zone under the MEM Act and regulations. Under Section 56 of the MEM Act, for any development on land that is in the locality of a marine park, the consent authority must take into consideration the Act and potential impacts on the marine park.

Furthermore, marine park legislative requirements require that certain activities require consent (in the form of a marine park permit), including the following (as per the respective Sections of the Marine Estate Management (Management Rules) Regulation 1999):

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- Interference or damage to any part of habitat (Clause 1.16).
- Commercial (Clause 1.32) or research activities (Clause 1.31).
- Organised sporting, educational or recreational activities (Clause 1.34).

The above requirements mean that for the CMP some of the actions that occur within the marine park or affecting the marine park may require consent in the form of a marine park permit under marine estate legislation before implementation can commence.

1.5.3 Related Plans and their Linkages to the CMP

It is important to note that there are a range of external (and/or parallel) plans and programs that are relevant to the CMP – and these are implemented at a local, state, and federal level. A summary of these plans is outlined in the Stage 1 Scoping Study (Advisian, 2020). Those of particular relevance to key issues across the study area are summarised below.

NSW Marine Estate Strategy 2018-2028 (MEMS)

The MEMS was developed to support the objectives of the MEM Act, and identifies a number of environmental, social, cultural, and economic threats to the NSW marine estate. MEMA sets out 9 management initiatives:

1. Improving water quality and reducing litter
2. Delivering healthy coastal habitats with sustainable use and development
3. Planning for climate change
4. Protecting the Aboriginal cultural values of the marine estate
5. Reducing impacts on threatened and protected species
6. Ensuring sustainable fishing and aquaculture
7. Enabling safe and sustainable boating
8. Enhancing social, cultural and economic benefits
9. Delivering effective governance.

The Shoalhaven CMP considers all of these initiatives and supports the objectives of the MEM Act.

The Shoalhaven 2032 Community Strategic Plan (CSP)

Council has developed an overarching CSP that sits at the top of its planning hierarchy and identifies the community's main priorities and expectations for the future, and ways to achieve these goals. This forms part of an Integrated Planning and Reporting framework and is required by the LG Act. The Shoalhaven CSP has 4 themes and ten key priorities. As part of Stage 1, an assessment was performed to ensure that the CMP strategic objectives were aligned with the key priorities of the CSP (Advisian, 2020), which include (Shoalhaven City Council, 2023b):

- Resilient, Safe , Accessible & Inclusive Communities.
- Sustainable, Liveable Environments.
- Thriving local economies that meet community needs.
- Effective, Responsible & Authentic Leadership.

Illawarra Shoalhaven Regional Plan 2041

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The Illawarra Shoalhaven Regional Plan 2041 aims to protect and enhance the region's assets and plan for a sustainable future. It is a 20-year land use plan that applies to the local government areas of Wollongong, Shellharbour, Kiama, and Shoalhaven. The 4 key themes underpinning the regional plan are the following:

- A productive and innovative region
- A sustainable and resilient region
- A region that values people and places
- A smart, connected and accessible region.

The Shoalhaven CMP considers these themes and ensures that all its management actions are in alignment with the regional plan.

Shoalhaven Local Environment Plan 2014 (LEP)

The LEP details the rules and guidelines for the management and control of development through land zoning. Clause 7.4 Coastal Risk Planning of the LEP sets out provisions to ensure that the use and development of land in Shoalhaven LGA is compatible with the associated coastal risks and hazards as defined by the CM Act.

Shoalhaven Development Control Plan 2014 (DCP)

Chapter G6 of the DCP identifies several precincts for development controls for beach erosion and/or inundation areas. These precincts are based on coastal hazard mapping undertaken in 2017 for the beaches on the basis of Council's adopted sea level rise projections, as well as the combined coastal erosion and creek instability hazard that was assessed for the beaches of the Shoalhaven LGA at that time. Coastal cliff and slope instability hazard is included in the DCP based on geotechnical hazard mapping undertaken in 2009, which has subsequently been updated in Stage 2 of this CMP. The DCP provides links to Council's interactive coastal hazard mapping on its website.

1.5.4 Social and Economic Context

Shoalhaven LGA is located on the south coast of NSW, about 160 km south of Sydney. It is bounded by Kiama LGA to the north, and Eurobodalla LGA to the south. The land area covered by Shoalhaven LGA is 4,561 km^2, with the primary population centres spread along the coastline, including Nowra-Bomaderry, Milton-Ulladulla, Huskisson-Vincentia, St Georges Basin District, Culburra Beach, and Sussex Inlet. National parks, state forests, bushland, beaches, and lakes are key drawcards to the area and provide for a range of recreational and commercial activities.

The Shoalhaven LGA is a growing regional centre, and a key hub for the State's south-north coast. Whilst the region has historically been a popular spot for retirement, in recent decades it has continued to attract residents as traditional economic sectors such as agriculture and tourism have expanded into education, health, and professional services.

The total population in Shoalhaven LGA is around 110,000 and is forecasted to grow to 143,000 by 2050 (idCommunity, 2022), an increase of 27%. Over the coming decades, this growth will require significant changes to the built environment that will place additional pressure on the coastal zone.

During peak holiday seasons, the Shoalhaven LGA population doubles or even triples; however, the day trip visitors and tourism outside the peak summer holiday period has also increased by 40%, indicating the high value of tourism to the economic growth of the region (Advisian, 2020). This can result in a large proportion of absentee land owners; the permanent residential occupancy rates are less than 50%.

The coastal zone supports tourism and fisheries in the region, with an estimated 12% of jobs supported by tourism (Advisian, 2020). Ulladulla is a key centre for commercial fishing, whilst recreational fishing is popular

across the entire LGA. There are 3 aquaculture leases in Jervis Bay, allowing commercial farming of native shellfish, with at least 11 oyster farms operating at Greenwell Point and in the lower Shoalhaven River Estuary (Advisian, 2020).

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2 SNAPSHOT OF ISSUES

2.1 Overview

The Stage 1 Scoping Study Report (Advisian, 2020) provides a detailed description of the environmental, social, cultural, and economic context for coastal management across the Shoalhaven open coastline. This context has determined the scope of the CMP in terms of identifying:

- The environmental, social, cultural, and economic values of the study area.
- The various threats to values, and the resulting risks and vulnerabilities.

During Stage 2 of the CMP, the risks, vulnerabilities, and opportunities across the study area were assessed in detail. Full details are provided in the Shoalhaven Open Coast and Jervis Bay CMP Stage 2 – Risks, Vulnerabilities, and Opportunities Report (Water Technology, 2023a). This Stage 2 assessment built on the work undertaken in Stage 1, and investigated relevant risks, vulnerabilities, and opportunities across the study area in order to inform the development and assessment of management actions for Stages 3 and 4. It included a robust analysis of both current and emerging risks and was undertaken in alignment with the risks and threats identified in the following work studies:

- The Stage 1 Scoping Study Report (Advisian, 2020) (See Figure 2-1).
- The Shoalhaven Coastal Hazard Mapping Review (Advisian, 2016).
- The Shoalhaven Coastal Zone Management Plan Risk Assessment (Advisian, 2018a).
- The NSW Marine Estate Threat and Risk Assessment (TARA) (BMT WBM, 2017) – and included strong consideration of stressors identified in the TARA as high priority stressors for the south coast of NSW (See Figure 2-1).
- Update of Coastal Cliff and Slope Hazard Mapping for the Shoalhaven LGA Coastal Cliff and Slope Assessment (Douglas Partners, 2023).

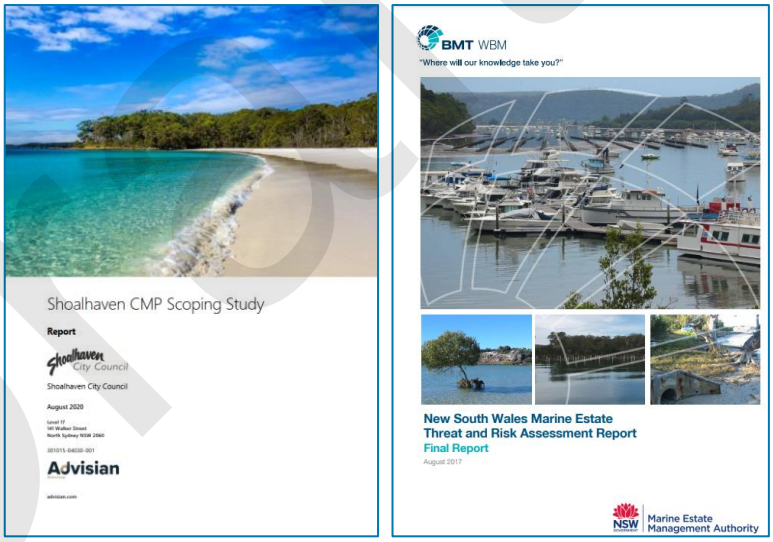

Figure 2-1 The Stage 1 Scoping Study and TARA

The assessment process included a detailed and quantified risk assessment for two key components:

- Coastal hazard risks to land, property, assets and infrastructure – further described in Section 2.2.
- Social, cultural, and environmental risks – further described in Section 2.3.

As required by the CM Act, the key risks and threats have been considered over a range of timeframes, including the present day, as well as future planning horizons 20 years, 50 years, and 100 years in order to account for future climate changes impacts, and the impacts of population growth and future development on the coastal zone. Section 21 (3) (b) of the CM Act requires local councils to follow a risk management process when preparing their CMPs and identifying where management actions are required. Subsequently, Stage 2 of the CMP applied a risk-based framework consistent with those applied in the 2018 coastal hazard risk assessment (Advisian, 2018a), the Scoping Study First Pass Risk Assessment (Advisian, 2020), and where possible has sought to be consistent with Council's organisational Risk Management Framework (Shoalhaven City Council, 2022).

2.2 Coastal Hazards

2.2.1 Coastal Hazards Overview

Coastal Erosion and Inundation

The Shoalhaven LGA coastline has a long history of experiencing severe coastal hazard impacts. The most severe coastal hazard events across the study area are those caused by the episodic storm systems called East Coast Lows (ECLs). ECLs are intense low-pressure systems that occur off the east coast of Australia. They bring damaging winds, heavy rainfall, storm surges and energetic wave conditions (DPE, 2023).

The most severe coastal hazard events in living memory occurred during the mid-to-late 1970s, with a series of ECLs occurring between 1974 and 1978 that generated severe coastal erosion and coastal inundation across much of the NSW coast – including the Shoalhaven LGA. Severely impacted areas included Shoalhaven Heads (see Figure 2-2), Currarong Beach, Callala Beach (see Figure 2-3), Collingwood Beach, and Mollymook Beach (Shoalhaven City Council, 2018; Water Technology, 2023a).



Figure 2-2 Shoalhaven Heads Beach showing Surf Club in 1977 (left) and following rock protection in 1978 (right). Image source: DPE.

In June 2016, another major ECL event resulted in severe storm erosion at Culburra Beach, Currarong Beach (see Figure 2-4), Bendalong Boat Harbour, and Collingwood Beach. This event also generated damage to coastal infrastructure, including the coastal revetment that protects the Princes Highway at Ulladulla, which subsequently required repair (Figure 2-5). Low lying wastewater infrastructure was also exposed to wave run-up and coastal inundation hazards at some locations such as Narrawallee Beach (see Figure 2-6).



Figure 2-3 The Callala Beach coastal erosion event of 1974. Image source: A. Gordon

In more recent times, a sequence of 5 ECL events occurred in between 2020 and 2022 – including February 2020, March 2021, June 2021, March 2022, and June 2022. These events generated severe erosion at Shoalhaven Heads and other locations such as Currarong Beach and demonstrated the erosion hazard risk generated by storm clustering. The resultant erosion led to the closure of access tracks (see Figure 2-7) due to loss of safe public beach access. The severity of the erosion was sufficient to trigger Council's coastal zone emergency action subplan (CZEAS) (Shoalhaven City Council, 2018), with Council undertaking post storm beach scraping to protect assets and infrastructure and maintain safe beach access. An example of Council's beach scraping from Bendalong Boat Harbour and Narrawallee Beach is provided in Figure 2-8 and Figure 2-9.

These real world impacts of coastal hazard impacts demonstrate the need for a risk-based assessment framework in order to identify the risks associated with these hazards, and use the information to develop and prioritise management actions to address such risks.



Figure 2-4 Erosion at Currarong Beach after June 2016 ECL. Image source: DPE.



Figure 2-5 Revetment repair works (left) and beach scraping (right), after the June 2016 ECL. Image source: SCC.



Figure 2-6 Wave run-up and coastal inundation of a sewage pump station at Narrawallee Beach during the June 2016 ECL. Image source: SCC.



Figure 2-7 Shoalhaven Heads after the sequence 2021 ECL storm events. Image source: SCC



Figure 2-8 Emergency beach scraping works undertaken by Council after storm events. Left: Bendalong Boat Harbour, April 2022. Right: Mollymook Beach, June 2020. Image source: SCC



Figure 2-9 Beach scraping and dune rebuilding works undertaken by Council at Narrawallee Beach in June 2022. Image source: SCC

Coastal Cliff and Slope Instability

The Shoalhaven LGA coastline is punctuated by a series of cliffs (also known as bluffs) and headlands. Cliffs and headlands with varying slope angles and up to approximately 50 m in height from the sea level are common features along the coastline (SMEC, 2008). Potential slope instability in cliffs and headlands constitutes a coastal hazard, also referred to as a slope instability hazard.

The Shoalhaven LGA is known to be an area of many geotechnical hazards with numerous coastal cliff and slope instability issues being documented in recent years (SMEC, 2008; Royal HaskoningDHV, 2018). Significant wet weather triggered a number of hazardous instability events (such as landslides and cliff erosion) in parts of the Shoalhaven LGA in January and February 2008, August 2015 (see Figure 2-10), and again in December 2021 and February 2022 (see Figure 2-10 and Figure 2-11).

Areas that have experienced historical coastal cliff and slope instability include the Culburra Beach bluff, Penguin Head, Plantation Point, Hyams Point, Berrara Headland, Inyadda Point, and the Mollymook Beach bluff (including Bannisters Headland). The geotechnical hazard analysis undertaken in Stage 2 of the CMP (Douglas Partners, 2023) has included a review and update of the mapping of areas affected by coastal cliff and slope instability across the Shoalhaven LGA.



Figure 2-10 Left: Coastal slope instability event at Bannisters Point, Mollymook in August 2015. Right: Wave-cut cliff collapse at Hyams Point in 2022 (Douglas Partners, 2023)



Figure 2-11 Coastal cliff and slope instability event at Inyadda Point following heavy rainfall in December 2021. (Douglas Partners, 2023)

2.2.2 Medium Term Processes

Coastal processes and hazards across the study area are also influenced by medium-term processes such as the El Niño Southern Oscillation (ENSO). In particular, the embayed beaches of the Shoalhaven experience a distinct morphological response to ENSO in the form of "beach rotation", whereby the alignment of the shorelines in these compartmental beach systems can rotate due to changes in the direction and energy of offshore wave conditions (as depicted in Figure 2-12):

- During El Niño phases: The offshore wave climate shifts more southerly compared to the long term average. Therefore, the northern end of the beach accretes while the southern end erodes resulting in a net clockwise rotation of the beach around its centre.
- During La Niña phases: The offshore wave climate shifts more northerly compared to the long term average. Therefore, the northern end of the beach erodes while the southern end accretes resulting in a net anti-clockwise rotation of the beach.

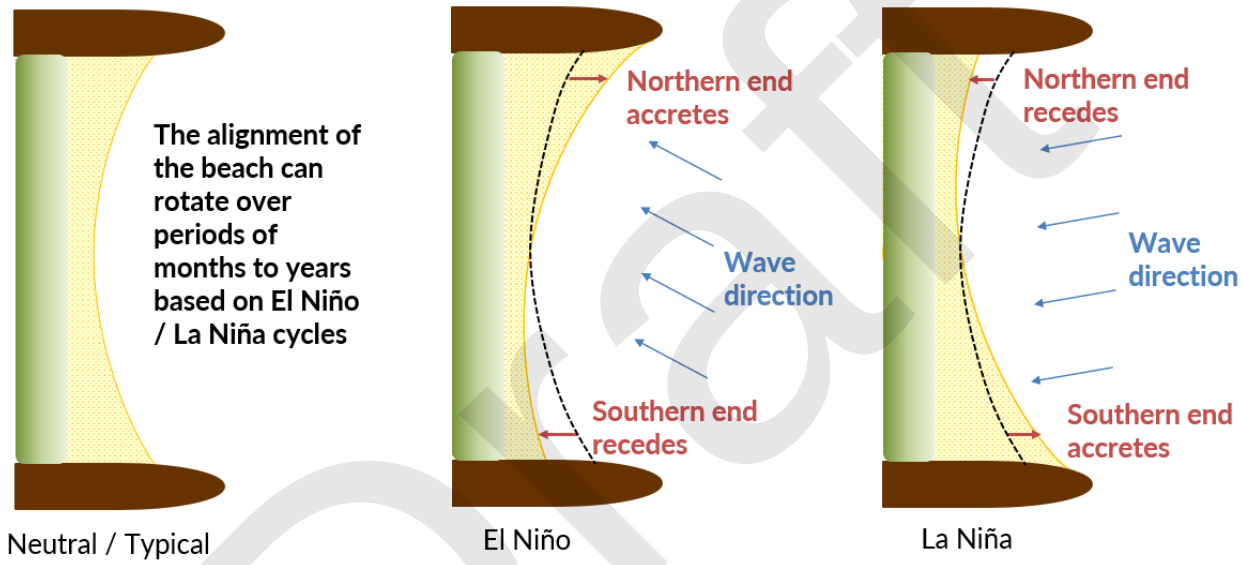

Figure 2-12 Overview of beach rotation

Analysis undertaken during Stage 2 of the CMP indicates that many of the beaches in the Shoalhaven LGA experience a rotation effect to some degree (Water Technology, 2023a), and beaches such as Mollymook Beach can rotate from their mean position by 25-30m (Beadle, Smith, & Smith, 2023). This "rotation" process can pose complex challenges for coastal communities and ecosystems – and have the potential to exacerbate the impacts of other coastal hazard processes such as storm erosion.

2.2.3 Climate Change Impacts

The recently published IPCC 6th Assessment Report opens with a clear statement *"It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean cryosphere and biosphere have occurred"* (IPCC, 2021). This statement indicates that changes to our climate have occurred and will continue to do so. It is therefore prudent to consider potential impacts of climate change on local coastal processes and hazards.

Research into the implications of sea level rise (SLR) for Australia has been conducted by a broad spectrum of individuals and organisations that includes universities, research institutes, consultancies, government bodies and community groups. There are numerous studies that have assessed historical long term global mean SLR. The IPCC Sixth Assessment Report indicates that the thermal expansion of the oceans and glacial melting have been the dominant contributors to 20th century global mean sea level rise, and this pattern is

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likely to continue to 2100. The report states that "*Global mean sea level increased by 0.20 m between 1901 and 2018. The average rate of sea level rise was 1.3 mm/yr between 1901 and 1971, increasing to 1.9 mm/yr between 1971 and 2006, and further increasing to 3.7 mm/y between 2006 and 2018 (high confidence). Human influence was very likely the main driver of these increases since at least 1971*".

In 2014, the South Coast Regional Sea Level Rise Planning and Policy Framework (Whitehead & Associates, 2014) was prepared as a joint Shoalhaven City Council – Eurobodalla Shire Council project, supported by the NSW State Government (the then Office of Environment and Heritage) to provide advice to both councils for selecting regional SLR benchmarks. The recommendations of the Policy and Planning Framework (Whitehead & Associates, 2014) were considered in conjunction with a range of technical industry submissions (Shoalhaven City Council, 2016). Subsequently, the following SLR projections were adopted by SCC at their Policy and Resources Committee meeting on 10 February 2015 (Shoalhaven City Council, 2015):

- 10 cm by 2030.
- 23 cm by 2050.
- 36 cm by 2100.

Council also resolved to "*review the projections based on real data every 7 years, with tidal gauges at HMAS Creswell and Ulladulla being included in the calculations along with other NSW gauges, modelled, or corrected altimeter data be excluded unless new satellites overcome the present measurement error*" (Shoalhaven City Council, 2015).

The impacts of SLR will manifest as they exacerbate each of the coastal hazards that impacts the study area:

- Long-term shoreline recession is expected to intensify as sea levels rise, leading to the progressive inland movement of coastlines and loss of coastal land.
- Coastal estuary entrance instability will be impacted by SLR as it can alter the equilibrium of tidal flows and affect the stability of estuary entrances.
- SLR will increase the risk of coastal cliff and slope instability as rising water levels can undermine the stability of coastal cliffs and slopes an increase the wave energy that coastal cliffs are exposed to.
- Storm tide inundation will become more severe with SLR, leading to higher water levels during storms and increased frequency and severity of coastal inundation.
- Tidal inundation, which includes both nuisance flooding and saltwater intrusion, will become more frequent and extensive as sea levels continue to rise, affecting low-lying coastal areas.

2.2.4 Coastal Hazard Risk Assessment

A key component of the CMP Stage 2 was to undertake an assessment of the risks generated by the relevant coastal hazards listed in the CM Act. These hazards are listed in

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Table 2-1, which shows that 6 out of the 7 hazards defined in the CM Act have been addressed as part of this CMP. The 7th hazard ("*Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters*"), is not applicable to open coast settings, and is being addressed for the estuaries of the Shoalhaven LGA through estuary CMPs. It should also be noted that tsunami are not listed as a coastal hazard under the CM Act, and that the management of this hazard is addressed by the NSW SES in the NSW state tsunami plan (NSW SES, 2018) – see Section 1.5.

The Stage 2 risk assessment built on a significant body of work undertaken in recent years to study and identify coastal hazard risks across the Shoalhaven LGA. Detailed coastal hazard mapping has been prepared as part of the Shoalhaven Coastal Hazard Mapping Review (Advisian, 2016), with the mapping extending from Shoalhaven Heads in the north to Collers Beach in the south. Subsequently, a risk assessment was undertaken based on those hazard lines in the Shoalhaven Coastal Zone Management Plan Risk Assessment (Advisian, 2018a), which included identification of at-risk private properties, as well as public assets and infrastructure falling under the following categories:

- Wastewater assets – including sewerage infrastructure, pump stations, sewer gravity mains. and rising mains.
- Water supply infrastructure – including mains and pump stations.
- Major infrastructure – including buildings such as amenity blocks, surf clubs, and community buildings, as well as car parks.
- Minor infrastructure – including any other infrastructure such as amenities like picnic tables, seating, playgrounds, viewing platforms etc.
- Public roads.

The risk assessment work was undertaken to assess coastal hazard risks in the present day, as well as for a range of future sea level scenarios defined by Council's SLR framework (Shoalhaven City Council, 2015), as depicted in Table 2-2. In order to supplement this work and consider planning horizons up to 100 years (as required by the CM Act), an additional risk assessment was undertaken in Stage 2 of the CMP in order for a range of additional future SLR scenarios listed in Table 2-2.

However, it should be noted that the Shoalhaven Coastal Hazard Mapping Review (Advisian, 2016) dataset does not include mapping for all of the 40 Council managed beaches, and covers only the beaches in between Shoalhaven Heads and Collers Beach. Subsequently, a qualitative coastal hazard risk assessment was undertaken for the remaining Council managed beaches using mapping obtained from the NSW Statewide Coastal Erosion Exposure Assessment (OEH, 2017a).

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Table 2-1 Coastal hazards listed under the CM Act

Coastal hazards addressed in this CMP		
 (1) Beach erosion	 (2) Shoreline recession	 (3) Coastal lake or watercourse entrance instability
 (4) Coastal cliff or slope instability	 (5) Coastal inundation	 (6) Tidal inundation
Coastal hazards not addressed in this CMP		
 (7) Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters		

Table 2-2 Future SLR scenarios considered in this CMP

Council SLR Framework (2015) Scenarios assessed in CZMP (Advisian, 2018a)	Additional Scenarios considered in Stage 2 of the CMP (Water Technology, 2023a)
▪ +0.10 m (2030) ▪ +0.23 m (2050) ▪ +0.36 m (2100)	▪ +0.60 m (50 to 100 Years) ▪ +0.90 m (50 to 100 Years) ▪ +1.20 m (100+ Years)

The outcomes of the risk assessment are summarised in Table 2-3. This breaks down the level of risk to infrastructure at each beach by asset type. Full details are provided in the Stage 2 Report (Water Technology, 2023a). Each of the local area risks in Table 2-3 have been assigned a risk identification code (ID). Local area actions described in Section 4 identify which of the local area risks they are intended to address – see Table 4-5 to Table 4-8.

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Table 2-3 Summary of coastal hazard risks to infrastructure

Beach	Asset Type	Parameter	Risk ID	Present Day	~20-80 years		~50-100 years		100+ years
					+0.23m SLR	+0.36m SLR	+0.6m SLR	+0.9m SLR	+1.2m SLR
Shoalhaven Heads	Private Properties	Lots Impacted	CHR.1	0	0	0	0	2	2
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.2	Low	Low	Low	Low	Low	Moderate
		Water	CHR.3	Low	Low	Low	Low	Low	Moderate
		Infrastructure Major	CHR.4	High	High	Extreme	Extreme	Extreme	Extreme
		Infrastructure Minor	CHR.5	Moderate	High	High	High	High	High
		Roads	CHR.6	Low	Low	Low	Low	Moderate	Moderate
Culburra Beach	Private Properties	Lots Impacted	CHR.7	1	28	62	79	110	127
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.8	Low	Low	Low	Moderate	Moderate	High
		Water	CHR.9	Low	Low	Low	Low	Moderate	High
		Infrastructure Major	CHR.10	Moderate	Moderate	Moderate	High	High	Extreme
		Infrastructure Minor	CHR.11	Low	Low	Low	Low	Low	Low
		Roads	CHR.12	Moderate	Moderate	High	High	High	Extreme
Warrain Beach	Private Properties	Lots Impacted	CHR.13	0	0	0	3	4	7
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.14	Low	Low	Moderate	Moderate	Moderate	Moderate
		Water	CHR.15	Low	Low	Low	Low	Low	Low
		Infrastructure Major	CHR.16	High	High	High	Extreme	Extreme	Extreme
		Infrastructure Minor	CHR.17	Low	Low	Low	Low	Low	Low
		Roads	CHR.18	Low	Low	Low	Low	Low	Low
Currarong Beach	Private Properties	Lots Impacted	CHR.19	20	29	43	43	43	58
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.20	High	High	High	High	High	High
		Water	CHR.21	Moderate	Moderate	High	High	High	High
		Infrastructure Major	CHR.22	High	High	High	High	High	High
		Infrastructure Minor	CHR.23	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
		Roads	CHR.24	High	High	High	High	High	Extreme

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Beach	Asset Type	Parameter	Risk ID	Present Day	~20-80 years		~50-100 years		100+ years
					+0.23m SLR	+0.36m SLR	+0.6m SLR	+0.9m SLR	+1.2m SLR
Callala Bay	Private Properties	Lots Impacted	CHR.25	0	0	0	0	0	11
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.26	Low	Low	Low	Low	Moderate	High
		Water	CHR.27	Low	Low	Low	Low	Low	Low
		Infrastructure Major	CHR.28	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
		Infrastructure Minor	CHR.29	Low	Low	Low	Low	Low	Low
		Roads	CHR.30	Low	Low	Low	Moderate	Moderate	Moderate
Callala Beach	Private Properties	Lots Impacted	CHR.31	82	82	82	82	100	125
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.32	Low	Low	Low	Low	High	High
		Water	CHR.33	Low	Low	Low	High	High	High
		Infrastructure Major	CHR.34	High	High	High	High	High	Extreme
		Infrastructure Minor	CHR.35	Low	Low	Low	Low	Low	Low
		Roads	CHR.36	Low	Low	High	High	High	Extreme
Huskisson and Collingwood Beaches	Private Properties	Lots Impacted	CHR.37	1	34	42	76	81	96
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.38	Moderate	High	High	High	High	Extreme
		Water	CHR.39	Low	Low	Low	High	High	High
		Infrastructure Major	CHR.40	High	High	High	High	High	High
		Infrastructure Minor	CHR.41	Low	Low	Low	Low	Low	Low
		Roads	CHR.42	High	High	High	High	High	High
Bendalong Boat Harbour Beach	Private Properties	Lots Impacted	CHR.43	0	0	0	0	0	0
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.44	Low	Low	Low	Low	Low	High
		Water	CHR.45	Low	Low	Low	Low	Low	Low
		Infrastructure Major	CHR.46	High	High	High	High	High	High
		Infrastructure Minor	CHR.47	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
		Roads	CHR.48	High	High	High	High	High	High

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Beach	Asset Type	Parameter	Risk ID	Present Day	~20-80 years		~50-100 years		100+ years
					+0.23m SLR	+0.36m SLR	+0.6m SLR	+0.9m SLR	+1.2m SLR
Narrawallee Beach	Private Properties	Lots Impacted	CHR.49	1	2	2	4	6	29
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.50	High	High	High	High	High	Extreme
		Water	CHR.51	Low	Low	Low	Low	Low	High
		Infrastructure Major	CHR.52	Moderate	Moderate	High	High	High	High
		Infrastructure Minor	CHR.53	Low	Low	Low	Low	Low	Low
		Roads	CHR.54	Low	Low	Low	Moderate	Moderate	High
Mollymook Beach	Private Properties	Lots Impacted	CHR.55	2	21	32	50	67	82
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.56	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
		Water	CHR.57	Low	Moderate	High	High	High	High
		Infrastructure Major	CHR.58	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
		Infrastructure Minor	CHR.59	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
		Roads	CHR.60	High	High	High	High	High	High
Collers Beach	Private Properties	Lots Impacted	CHR.61	1	1	1	1	1	1
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.62	High	High	High	Extreme	Extreme	Extreme
		Water	CHR.63	Low	Low	Low	Moderate	Moderate	Moderate
		Infrastructure Major	CHR.64	Moderate	Moderate	Moderate	High	High	High
		Infrastructure Minor	CHR.65	Low	Low	Low	Low	Low	Low
		Roads	CHR.66	Low	Low	Low	Low	Low	Moderate
Southern LGA Beaches^	Private Properties	Lots Impacted	CHR.67	N/A	N/A	N/A	N/A	N/A	N/A
	Cumulative Risk Level for Public Infrastructure	Wastewater	CHR.68	High	High	High	Extreme	Extreme	Extreme
		Water	CHR.69	High	High	High	Extreme	Extreme	Extreme
		Infrastructure Major	CHR.70	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
		Infrastructure Minor	CHR.71	High	High	High	High	High	High
		Roads	CHR.72	High	High	High	High	Extreme	Extreme

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^ note that the existing hazard mapping extends only as far south as Collers Beach. Subsequently, the coastal risk assessment for beaches south of Collers Beach was qualitative in nature and based on mapping obtained from the NSW Statewide Coastal Erosion Exposure Assessment (OEH, 2017a). Note that the lack of detailed local coastal hazard line information meant that an assessment of the impact in private properties was not possible at those locations. This is discussed in detail in Section 2 of the Stage 2 Report.

2.3 Environmental, Social, and Cultural Risks

2.3.1 The Values of the Coastal Zone

The Shoalhaven LGA is one of the most biologically diverse regions in the NSW. The study area supports biodiversity that is important from national, state, regional and local perspectives, and the unique topography and geography provide the setting for a diverse range of terrestrial and marine ecosystems. Landforms of the coastline provide a variety of habitats including deep water cliffs, exposed, and sheltered sandy beaches (and dune systems), rock platforms, rocky reefs, soft-sediment bottoms, kelp forests, small estuaries, expansive seagrass meadows, mangrove forests and open ocean (Advisian, 2020). Much of the coastal waters of the study area are included in the Jervis Bay Marine Park and the Batemans Marine Park (see Figure 1-1), which extend from the three-nautical-mile offshore limit of NSW waters to the mean high water mark within all rivers, estuaries, bays, lagoons, inlets, and saline and brackish coastal lakes.

The Shoalhaven LGA is a growing residential and tourist area and is the most visited LGA in NSW outside of Sydney. It encompasses a total land area of 4,561 square kilometres comprised of national park, state forest, bushland, beaches, and lakes. The population is primarily concentrated along the coast in major centres and numerous small centres (Advisian, 2020). Furthermore, the coastal zone of the Shoalhaven LGA supports activities such as tourism, which forms a substantial portion of the local economy. As a primary tourism destination in NSW, the summer population of coastal villages peak at double or triple its normal amount. In recent years, the Shoalhaven LGA has seen significant increases in day trip visitors to its coast and tourism outside of peak season has increased by 40% (Advisian, 2020).

The Shoalhaven LGA has a rich and continuing Indigenous heritage, with cultural history that goes back 60,000 years. Indigenous cultural heritage consists of places and items that are of significance to Indigenous peoples because of their traditions, observances, lore, customs, beliefs, and history. It provides evidence of the lives and existence of Indigenous peoples before European settlement through to the present. Cultural heritage values of the area are dynamic and includes both tangible and intangible elements. Indigenous cultural heritage sites include men's and women's sites; initiation grounds; corroboree grounds; landscape creation stories; and named places.

2.3.2 Key Issues and Risks

As part of this stage of the CMP process, the First Pass Risk Assessment undertaken during Stage 1 (Advisian, 2020) was updated and assessed in greater detail in Stage 2 – incorporating the updated assessment of coastal hazard risks above. The threats were reviewed with respect to the CMA mapping extents and their respective management objectives. In order to adequately inform the derivation and assessment of management options, these risks were assessed at a local level on a beach-by-beach basis.

The nature and severity of these risks varies widely across the study area. The most common issues reported across the beaches, headlands, and coastal waters of the Shoalhaven LGA are summarised in Table 2-4.

A full list of social, cultural, and environmental issues and risks across the study area is provided in Table 2-5. Each of the local area risks in Table 2-5 have been assigned a risk identification code (ID). Local area actions described in Section 4 identify which of the local area risks they are intended to address – see Table 4-5 to Table 4-8.

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Table 2-4 Key environmental, social and cultural risks and opportunities

Environmental		Social (Public Safety and Amenity)		Cultural	
	Weeds and invasive species		Coastal hazard impacts on public safety		Tangible and intangible Aboriginal Cultural Heritage (ACH) protection
	Vegetation vandalism		Coastal hazard impacts on safe and sustainable beach access		Community and visitor education and awareness of ACH values
	Recreational use impacts on dunes		Ensuring safe boating access to coastal waters		Increasing First Nations participation in management of coastal country
	Climate change impacts on habitats and biodiversity		Maintenance of recreational amenity		
	Population growth and coastal development impacts on habitats and biodiversity		Population growth impacts on social and recreational amenity		

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Table 2-5 Risk assessment outcomes for Environmental, Social, and Cultural risks (from Stage 2 Report)

Location	ID	Risk Category	Risk Description	Likelihood (1-5)		Consequence (1-5)		Present-Day Risk Rating		Risk Rating Over Future Planning Horizons		
										20 yrs	50 yrs	100 yrs
Shoalhaven Heads	SER.5.1	Public Safety	Beach access and safety from high and steep eroded scarps	4	Likely	3	Moderate	12	High	High	High	High
	SER.5.2	Public Safety	Build-up of dunes in front of surf club reducing visibility of beach and reducing access for service vehicles	4	Likely	3	Moderate	12	High	High	High	High
	SER.5.3	Environmental	Impact on dune vegetation due to 4WD beach access	4	Likely	2	Minor	8	Moderate	Moderate	Moderate	Moderate
	SER.5.4	Environmental	Dune migration and blowout smothering dune vegetation	5	Almost Certain	3	Moderate	15	High	High	High	High
	SER.5.5	Environmental	Impact on dune vegetation from erosion	4	Likely	3	Moderate	12	High	High	High	High
	SER.5.6	Environmental	Encroachment of weeds onto dune vegetation	4	Likely	3	Moderate	12	High	High	High	High
	SER.5.7	Environmental	Impacts on nesting shorebirds	5	Almost Certain	3	Moderate	15	High	High	High	High
Culburra Beach	SER.6.1	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	3	Possible	4	Major	12	High	High	High	High
	SER.6.2	Public Safety	Risk to beach users through lack of surf club facilities	4	Likely	4	Major	16	High	High	Extreme	Extreme
	SER.6.3	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.6.4	Environmental	Encroachment of weeds onto dune vegetation	4	Likely	3	Moderate	12	High	High	High	High
	SER.6.5	Environmental	Impact on dune vegetation from vegetation vandalism	4	Likely	3	Moderate	12	High	High	High	Extreme
Warrain Beach	SER.7.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.7.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	3	Possible	4	Major	12	High	High	High	High
	SER.7.3	Environmental	Impact on dune vegetation from vegetation vandalism	5	Almost Certain	3	Moderate	15	High	High	High	Extreme
	SER.7.4	Environmental	Impacts on nesting shorebirds	5	Almost Certain	3	Moderate	15	High	High	High	High
Currarong Beach	SER.8.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.8.2	Public Safety	Adverse wave conditions and surging at the boat ramp	3	Possible	4	Major	12	High	High	High	High

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Location	ID	Risk Category	Risk Description	Likelihood		Consequence		Present-Day Risk Rating		Risk Rating Over Future Planning Horizons		
				(1-5)		(1-5)				20 yrs	50 yrs	100 yrs
	SER.8.3	Public Safety	Wastewater overflows and water quality	4	Likely	4	Major	16	High	High	Extreme	Extreme
	SER.8.4	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.8.5	Amenity	Limited access to the foreshore / waterway	5	Almost Certain	2	Minor	10	High	High	High	High
	SER.8.6	Environmental	Impact on dune vegetation from vegetation vandalism	5	Almost Certain	3	Moderate	15	High	High	High	Extreme
Callala Bay	SER.9.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.9.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.9.3	Environmental	Damage to seagrass beds from swing moorings, a result of dragging of swing moorings through seagrass beds	5	Almost certain	3	Moderate	15	High	High	High	High
	SER.9.4	Environmental	Damage to seagrass beds because of dragging of anchors	5	Almost certain	3	Moderate	15	High	High	High	High
	SER.9.5	Environmental	Dune erosion due to overland flow	5	Almost certain	2	Minor	10	High	High	High	Extreme
	SER.9.6	Environmental	Dune erosion due to uncontrolled pedestrian access	5	Almost certain	2	Minor	10	High	High	High	Extreme
	SER.9.7	Environmental	Loss of dune stability due to lack of native dune vegetation	5	Almost certain	2	Minor	10	High	High	High	Extreme
Callala Beach	SER.10.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.10.2	Environmental	Encroachment of weeds onto dune vegetation	4	Likely	4	Major	16	High	High	High	High
	SER.10.3	Environmental	Impact on dune vegetation from vegetation vandalism	4	Likely	4	Major	16	High	High	High	Extreme
Huskisson and Collingwood Beaches	SER.11.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.11.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.11.3	Environmental	Impact on dune vegetation from vegetation vandalism	5	Almost Certain	4	Major	20	High	High	High	Extreme
	SER.11.4	Environmental	Impacts on nesting shorebirds	5	Almost Certain	2	Minor	10	Moderate	Moderate	Moderate	Moderate
Plantation Point to Hyams Beach	SER.12.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High

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Location	ID	Risk Category	Risk Description	Likelihood		Consequence		Present-Day Risk Rating		Risk Rating Over Future Planning Horizons		
				(1-5)		(1-5)				20 yrs	50 yrs	100 yrs
	SER.12.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.12.3	Amenity	Limited access to the foreshore / waterway at Hyams Beach during peak season visitation	5	Almost Certain	4	Major	20	Extreme	Extreme	Extreme	Extreme
	SER.12.4	Amenity	Inadequate facilities at Hyams beach to cope with peak season visitation	5	Almost Certain	3	Moderate	15	High	High	Extreme	Extreme
	SER.12.5	Environmental	High recreational usage during peak season visitation at Hyams beach – impacts of litter and dune trampling etc	5	Almost Certain	3	Moderate	15	High	High	Extreme	Extreme
Cudmirrah to Bendalong	SER.13.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.13.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.13.3	Amenity	Loss of Beach Amenities at Bendalong	4	Likely	3	Moderate	12	High	High	High	High
	SER.13.4	Amenity	Loss of Beach Amenities at Washerwomans Beach	4	Likely	3	Moderate	12	High	High	High	High
	SER.13.5	Environmental	Dune Migration and Blowouts at Cudmirrah Beach	3	Possible	2	Minor	6	Moderate	Moderate	Moderate	Moderate
	SER.13.6	Environmental	Dune erosion due to overland flow at Bendalong	5	Almost Certain	1	Insignificant		Moderate	Moderate	High	High
	SER.13.7	Environmental	Beach erosion due to stormwater flows at Bendalong	5	Almost Certain	2	Minor	10	High	High	High	High
	SER.13.8	Environmental	Dune erosion due to uncontrolled pedestrian access at Bendalong	5	Almost Certain	2	Minor	10	High	High	High	High
Inyadda to Conjola Beaches	SER.14.1	Amenity	Loss of beach access to erosion	4	Likely	2	Minor	8	Moderate	Moderate	Moderate	Moderate
	SER.14.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.14.3	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	3	Moderate	12	High	High	High	High
Narrawallee Beach	SER.15.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.15.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	3	Possible	4	Major	12	High	High	High	High
	SER.15.3	Amenity	Inundation risk to low-lying foreshore reserves, resulting in loss of recreational amenity	3	Possible	3	Moderate	9	High	High	High	High

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Location	ID	Risk Category	Risk Description	Likelihood		Consequence		Present-Day Risk Rating		Risk Rating Over Future Planning Horizons		
				(1-5)		(1-5)				20 yrs	50 yrs	100 yrs
	SER.15.4	Environmental	Impacts on nesting shorebirds	5	Almost Certain	3	Moderate	15	High	High	High	High
Mollymook Beach	SER.16.1	Public Safety	Erosion risk to seaward end of coastal access tracks	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.16.2	Public Safety	Poor water quality, and impacts on amenity and public safety	4	Likely	2	Minor	8	Moderate	Moderate	Moderate	Moderate
	SER.16.3	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	3	Possible	4	Major	12	High	High	High	High
	SER.16.4	Amenity	Limited access to the foreshore and parking during peak summer periods	5	Almost certain	2	Minor	10	High	High	High	High
	SER.16.5	Environmental	Lack of adequate dune vegetation	4	Likely	2	Minor	8	Moderate	High	High	High
	SER.16.6	Environmental	Informal beach access tracks	4	Likely	2	Minor	8	Moderate	Moderate	Moderate	Moderate
	SER.16.7	Environmental	Uncontrolled stormwater and overland flows	5	Almost certain	2	Minor	10	High	High	Extreme	Extreme
	SER.16.8	Environmental	Estuary entrance instability	5	Almost certain	2	Minor	10	High	High	High	High
Collers Beach	SER.17.1	Amenity	Loss of Beach Amenities	4	Likely	2	Minor	8	Moderate	Moderate	High	High
	SER.17.2	Environmental	Dune erosion due to uncontrolled pedestrian access	5	Almost Certain	2	Minor	10	High	High	High	High
	SER.17.3	Environmental	Lack of adequate dune vegetation	4	Likely	2	Minor	8	Moderate	High	High	High
	SER.17.4	Environmental	Erosion due to Stormwater Drainage	4	Likely	2	Minor	8	Moderate	Moderate	Moderate	Moderate
	SER.17.5	Cultural Heritage	Pedestrian and vehicle impacts on ACH values	5	Almost Certain	3	Moderate	12	High	High	Extreme	Extreme
Ulladulla Harbour Beaches	SER.18.1	Public Safety	Unknown engineering function of Princes Highway revetment:	3	Possible	5	Catastrophic	20	High	High	Extreme	Extreme
	SER.18.2	Public Safety	Damage and dislocation of moored vessels during major storm events	2	Unlikely	4	Major	8	Moderate	Moderate	Moderate	Moderate
	SER.18.3	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.18.4	Amenity	Loss of beach amenity at central harbour beach	5	Almost Certain	1	Insignificant	5	Moderate	Moderate	High	High
	SER.18.5	Environmental	Lack of adequate dune vegetation	5	Almost Certain	2	Minor	10	High	High	High	High

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Location	ID	Risk Category	Risk Description	Likelihood		Consequence		Present-Day Risk Rating		Risk Rating Over Future Planning Horizons		
				(1-5)		(1-5)				20 yrs	50 yrs	100 yrs
	SER.18.6	Environmental	Erosion due to overland flow	5	Almost Certain	1	Insignificant	5	Moderate	Moderate	Moderate	Moderate
	SER.18.7	Environmental	Dune erosion due to uncontrolled pedestrian access	5	Almost Certain	2	Minor	10	High	High	High	High
Rennies to Wairo Beach	SER.19.1	Public Safety	Lack of safe beach access at Racecourse and Burrill beaches	2	Unlikely	4	Major	8	Moderate	High	High	High
	SER.19.2	Public Safety	Safety risk to beachgoers from unstable cliffs and bluffs	2	Unlikely	4	Major	8	Moderate	Moderate	High	High
	SER.19.3	Environmental	Impacts on nesting shorebirds at Rennies, Racecourse and Wairo Beaches	5	Almost Certain	3	Moderate	15	High	High	High	High
	SER.19.4	Environmental	Invasive dune flora at Rennies Beach	4	Likely	1	Insignificant	4	Low	Moderate	Moderate	Moderate
	SER.19.5	Environmental	Dune Migration and Blowouts at Wairo Beach	2	Unlikely	2	Minor	4	Low	Low	Low	Low
Southern LGA Beaches	SER.20.1	Public Safety	Adverse wave conditions and surging at the boat ramp at Bawley Point	3	Possible	3	Moderate	9	Moderate	Moderate	Moderate	Moderate
	SER.20.2	Public Safety	Unauthorised vehicle access to Bawley Point Headland resulting in injury	3	Possible	4	Major	12	High	High	High	High
	SER.20.3	Amenity	Limited access to the foreshore during peak season at Gannett Beach	5	Almost Certain	2	Minor	10	Moderate	Moderate	High	High
	SER.20.4	Amenity	Loss of foreshore amenity / beach access to due to erosion at Kioloa	3	Possible	4	Major	12	High	Extreme	Extreme	Extreme
	SER.20.5	Public Safety	Loss of Marine Rescue services to due to erosion at Kioloa	3	Possible	4	Major	12	High	High	Extreme	Extreme
	SER.20.6	Environmental	Vegetation Vandalism at Gannett Beach	5	Almost Certain	2	Minor	10	Moderate	Moderate	Moderate	Moderate
	SER.20.7	Environmental	Uncontrolled stormwater and overland flows exacerbating erosion at Kioloa foreshore	5	Almost Certain	2	Minor	10	Moderate	Moderate	High	High
	SER.20.8	Environmental	Lack of formal access tracks and pedestrian impacts on dune vegetation at Merry Beach	5	Almost Certain	2	Minor	10	Moderate	Moderate	Moderate	High

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3 STAKEHOLDER AND COMMUNITY ENGAGEMENT

3.1 CMP Engagement Overview

3.1.1 Overview

During Stage 1 of the CMP, a comprehensive Stakeholder and Community Engagement Strategy was developed (Advisian, 2020). This outlined the timing, content, and engagement methods to be utilised during Stages 2 to 4 of the CMP. The strategy was developed in accordance with CMP Engagement Guidelines (OEH, 2018), the Shoalhaven City Council Community Engagement Strategy (Shoalhaven City Council, 2023a) Policy and the use of the International Association for Public Participation (IAP2) guidelines.

This strategy has been implemented through the development of the CMP, which has involved a robust regime of stakeholder and community engagement integrated through all stages. A summary of the engagement process for the CMP is depicted in Figure 3-1 and described in the following sections.



Figure 3-1 Snapshot of CMP engagement process

3.1.2 The Get Involved Page

At the commencement of Stage 1 of the CMP, the Council established a *Get Involved* webpage for the project. Through Stages 1 to 4 of the CMP, the webpage has served as a central repository for the community that contains project information, updates, and pathways for direct engagement. It has included:

- **Background:** An overarching description of the project, and background to the CMP process – including the intent of the CMP, who is involved, and how it is developed. This has also been provided in the form of project summary videos, to clearly explain the project to the community.
- **Updates:** Updates on project progress as each stage of the CMP has evolved. This has been in the form of periodic project bulletins.
- **Key project deliverables:** including publishing the Stage 1, Stage 2, and Stage 3 reports for public consumption.
- **Engagement materials:** including project posters that provide succinct summaries of the preliminary options included in the CMP management actions "Long-List".

- **Engagement facilitation:** Information pertaining to community consultation events, and avenues for engagement – including links to the online survey facilitated during Stage 3 community consultation.
- **Explainer videos:** A video library that provides the community with short, clear video packages explaining the project and the CMP process.

3.2 Stage 1

The community and stakeholder engagement undertaken during Stage 1 comprised the following:

- **A Stakeholder Engagement Workshop** was held during, February 2019, with a meeting between Council and key government agencies. This workshop was an opportunity for stakeholders to contribute and have their say regarding the planning for, and implementation of, the CMP. The workshop was highly interactive and participatory. It included an initial presentation to the stakeholders in order to provide background and context and was then followed by a series of open forum, round-table discussion sessions covering the issues and risks across the study area. This also identified gaps in the existing CZMP and gathered some suggestions on how the suite of CMPs within the Shoalhaven LGA should be prioritised.
- **Six community consultation sessions** were held in September and October 2019 at Shoalhaven Heads, St Georges Basin, Sussex Inlet, Lake Conjola, Ulladulla, and Nowra. A total of 233 people attended these sessions, with a total of 550 pieces of feedback providing valuable insight into key issues surrounding management of the Shoalhaven open coast.
- **An online community questionnaire** was posted in order to obtain direct community input during the Scoping Study. The purpose of the community values survey was to obtain a snapshot of:
  - How often local residents visit the coastline and what activities they engage in whilst there.
  - What the local community considers to be the most important ecological, social, cultural, aesthetic, recreational, and economic values of the study area.
  - Community perceptions of key issues and attitudes towards potential management options.

3.3 Stages 2 and 3

3.3.1 Engagement Facilitation

The *Get Involved* webpage helped facilitate the Stage 3 engagement activities by hosting 3 key engagement elements, as described below and outlined in Figure 3-2.

- **An Option Booklet**: Providing information regarding larger (study area-wide) potential management options, including a detailed description of those options, their rationale and their potential benefits.
- **A Feedback Portal**: This web-based mapping tool allowed communities and stakeholders to provide feedback on local area options in the Stage 3 long list. Each of the (then) 140+ local area options were presented as a geolocated ‘pin’ on the mapping interface. By clicking on the option icon, respondents could read a short description of the option, and provide feedback in the form of:
  - An indication of support from a drop-down list, with choices of: ‘Support’, ‘Neutral / Don’t Know’, or ‘Do Not Support’.
  - A free text response where more detailed comments and feedback could be provided.
- **A Suggestion Portal**: This was an additional web-based mapping tool that allowed communities and stakeholders to provide suggestions for additional options for consideration as local area options in the Stage 3 long list. Suggestions could be provided in the form of a “pin” placed on a given area of interest, along with ability to then leave a short description of that suggestion and/or comment.

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Figure 3-2 Functionality of the online engagement portal

Snapshots of the Feedback Portal and Suggestion portals are provided in Figure 3-3. The *Get Involved* webpage also contained instructional booklets and videos to assist communities in using the engagement portals detailed above.

The engagement portals were left open for a 7-week period between 25 August and 16 October 2022.

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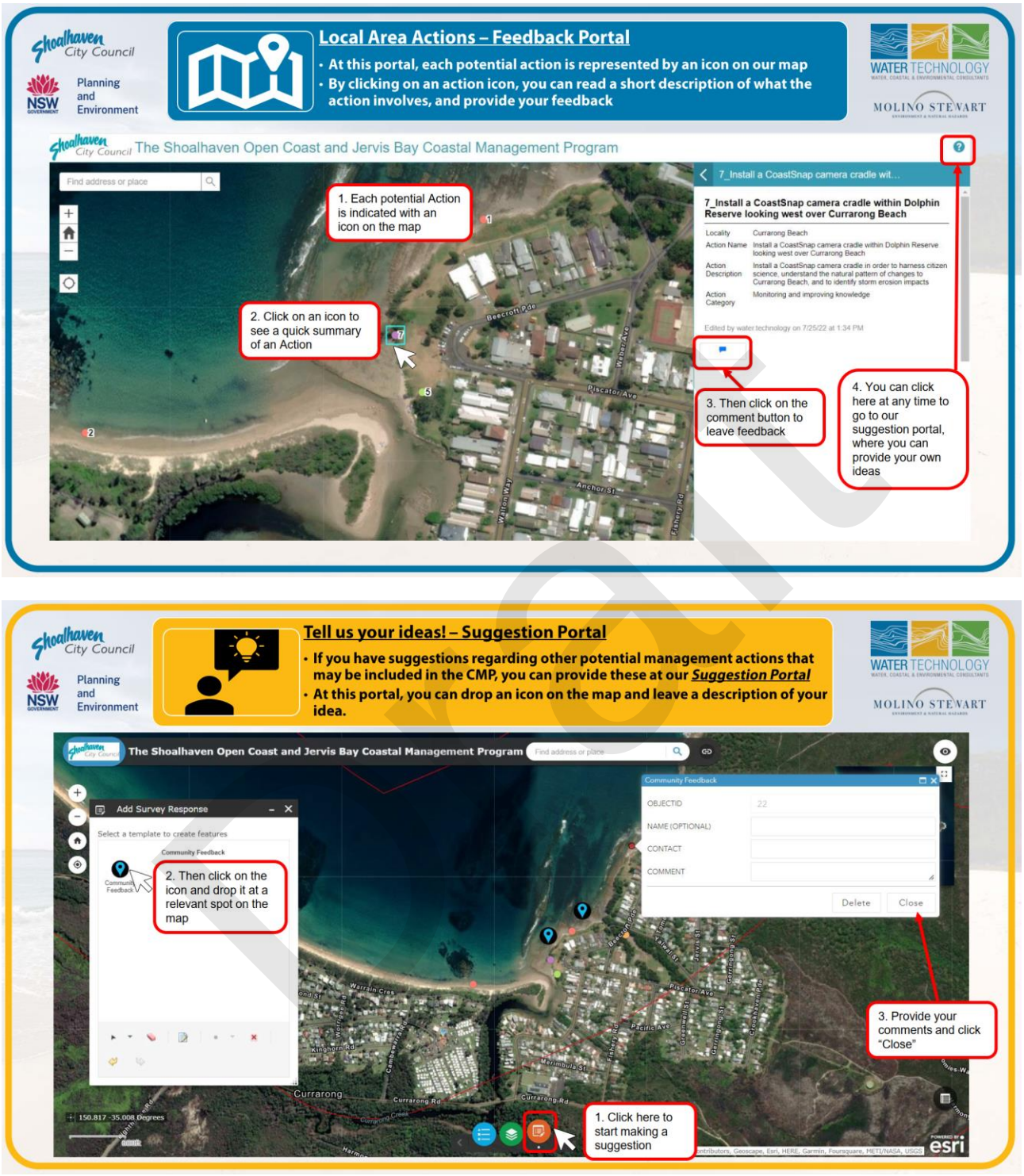

Figure 3-3 A snapshot of the Feedback Portal (top) and Suggestion Portal (bottom)

3.3.2 Community Engagement

Online Engagement Responses

The online engagement portal garnered a significant number of responses from the local communities. A total of 540 community members registered in the portal and provided responses. This included representatives

from different community groups from across the Shoalhaven LGA, comprising those listed in Section 1.5.1.4. A brief statistical summary of the responses is provided in Table 3-1.

Table 3-1 Summary of online portal responses

Overall Participant Metrics	Statistic
Total number of participants registered in the mapping portals	540
Percentage of participants who indicated that they "would like to be kept informed about the progress of the CMP"	82%
Feedback Portal Metrics	**Statistic**
Total number of local area options provided in the feedback portal	137
Total number of responses received	1,306
Average number of options responded to, per participant	2.7
Average (and median) number of responses received on each option	9.5 (5)
Suggestion Portal Metrics	**Statistic**
Total number of suggestions / comments received	187

A detailed summary of the online engagement responses in provided in the Stage 3 Report (Water Technology, 2023b). The community responses collected in the two portals were used in the following ways:

- Feedback Portal: Data from this portal provided quantified metrics of community support for each local area option in terms of % support. Refer to Section 4.1.3 for how this data was incorporated into the options assessment process.
- Suggestion Portal: All responses were thoroughly reviewed and, where feasible were added to the Stage 3 long list of management actions.

Community Drop-In Sessions

For those who preferred face-to-face engagement methods, a series of community drop-in sessions were held to obtain input for the Stage 3 options identification and assessment process. In total, 7 community drop-in sessions were held across 3 days during September 2022 – see Table 3-2.

Table 3-2 Summary of community drop-in sessions

	Southern CMP Study Area		Jervis Bay CMP Study Area		Northern CMP Study Area	
Date → Time ↓	Tuesday 6 September 2022		Wednesday 7 September 2022		Thursday 8 September 2022	
	Location	**Attendance**	**Location**	**Attendance**	**Location**	**Attendance**
Morning Session 10:00-12:00	N/A		Callala Beach Community Hall	32	N/A	
Afternoon Session 14:00-16:00	Ulladulla Civic Centre	25	Huskisson Community Centre	27	Shoalhaven Entertainment Centre (Nowra)	13
Evening Session 17:00-19:00	Ulladulla Civic Centre	4	Huskisson Community Centre	13	Shoalhaven Entertainment Centre (Nowra)	9
Number of Attendees	Total	**29**	Total	**72**	Total	**22**

Due to the large size of the study area, drop-in sessions were held in 3 separate locations across the northern (Nowra), central (Huskisson / Callala Beach) and southern (Ulladulla) regions of the study area. Details of

these events are provided in Table 3-2, including session attendance. Overall, the sessions were well attended, with 123 attendees in total.

During the drop-in sessions, community members were encouraged to drop by any time during the allotted hours (see Figure 3-4). The facilitation process for the sessions is summarised below:

- As people entered the venue, they were welcomed and directed to a 'welcome area', where a TV / projector screen played a short introductory video that provided:
  - Background into the project.
  - The purpose of the drop-in session.
  - Explanation of the drop-in session activities, including how to use the online engagement portal.
- Once this was complete, attendees were greeted by a member of the project team, and directed to:
  - Posters mounted on the wall that contained descriptions of the LGA-wide options and strategies.
  - Quick Response (QR) codes that allowed people to access the online engagement portal on their personal device (such as a smart phone or tablet).
  - A series of computer stations, where attendees could sit down, and navigate through the online portal on a larger screen with a member of the project team.



Figure 3-4 Drop-in session attendees watching an introductory video at the Callala Beach Community Hall, 7 September2022.

Community members were offered opportunities to provided verbal and written feedback on each of the potential management options, and the project in general. They were offered the opportunity to suggest additional options for consideration in the CMP – based on their local values and aspirations for the coastal zone. Robust in-person discussions were held between community members and members of the project team from Council, DPE and Water Technology.

3.3.3 Stakeholder Engagement with Public Authorities

During Stage 3 of the CMP, a robust engagement program was undertaken with representatives from key state government agencies as depicted in Figure 1-6. The engagement process included multiple rounds of engagement with these agencies, as shown in Figure 3-5. For the first round of engagement, a series of collaborative group online workshops were held in September 2022 with attendees from the agencies listed in Figure 1-6. The aims, methods and activities of the workshops were the same, but they covered two separate geographical areas:

- The first workshop covered the Jervis Bay Marine Park area.
- The second workshop covered the remainder for the CMP study area.

The workshops served as a key touch point for discussion with the agencies regarding potential management options for the CMP. The aims of the workshops were to:

- Provide project background – including a summary of project progress to date, and a summary of the key risks and opportunities identified in Stage 2.

- Provide an overview of the Stage 3 engagement process – including a demonstration of how to use the Feedback and Suggestion Portals.
- Commence initial discussions of potential management options where inter-agency coordination and/or agreement could be required.
- Undertake a whiteboarding session to identify stakeholder ideas for potential management options, and linkages to existing state agency initiatives and actions.

From here, representatives were directed to use the Feedback portal to provide direct agency feedback on potential management options and provide responses during the 7-week engagement period.

Subsequently, a series of targeted follow up workshops were undertaken individually with a number of agencies – including Crown Lands, DPI-Fisheries, NPWS, and TfNSW / MIDO. These workshops were undertaken in order to facilitate more detailed discussions for options of particular relevance to each agency. Discussion points included refinement of the options and their delivery pathways, garnering in-principal support to facilitate progress of the option to Stage 4, and discussing potential funding mechanisms.

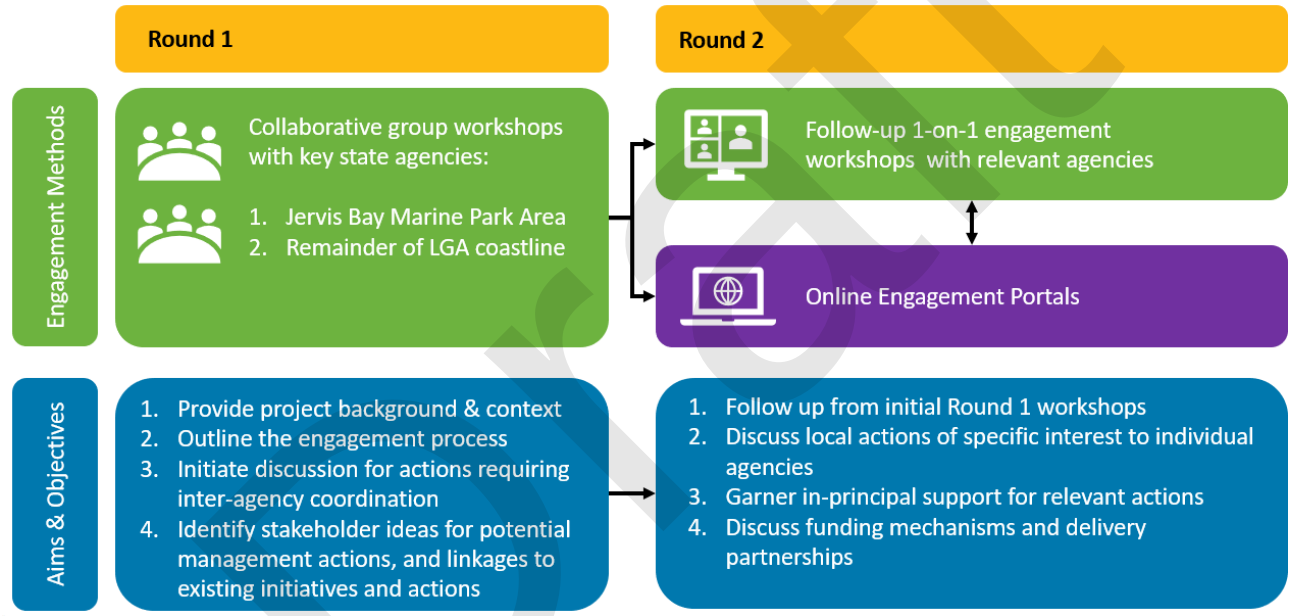

Figure 3-5 Stage 3 stakeholder engagement process with state agencies

Development of this CMP has also included engagement with adjacent local government stakeholders with whom Council shares a coastal sediment compartment boundary (see Figure 1-2). This includes:

- Kiama Council, and
- Eurobodalla Council.

These councils were engaged and consulted during Stage 3 of the CMP, in order to confirm support of any action located within shared sediment compartment boundaries.

3.3.4 Engagement with Local Indigenous Groups

As part of Stages 2 and 3 of the CMP, a multi-phase engagement process was undertaken with representatives from the following local Indigenous groups:

- Jerrinja Tribal Group.
- Jerrinja Local LALC.

- Ulladulla LALC.

Stage 2 Engagement

At the commencement of Stage 2 of the CMP, consultation was undertaken with representatives from the Jerrinja Tribal Group and Ulladulla LALC respectively. The purpose of these consultations was to:

- Follow up from the Stage 1 engagement process by providing a project update/briefing with important background into the CMP process and the process for engagement throughout.
- Obtain local knowledge regarding the various study area values and risks. Discussion was had regarding all manner of risks and values; however, a particular emphasis was placed on discussing the significant tangible and intangible indigenous cultural heritage across the study area and the Shoalhaven LGA more generally. Discussions were had regarding potential management options to address the aforementioned risks.
- To emphasise that the CMP is an opportunity for improved collaboration and to address some key issues affecting the coastal zone.

A summary of the discussed threats and risks is provided in the Stage 2 CMP Report (Water Technology, 2023a).

Stage 3 Engagement

During Stage 3 of the CMP, consultation was undertaken with representatives from the Jerrinja Tribal Group, the Jerrinja LALC, and Ulladulla LALC respectively. The purpose of these consultations was to:

- Follow-up on the previous engagement and outline how previous discussions had translated into potential management options proposed for the Stage 3 long list.
- Discuss all of the potential management options in the long list, with a particular emphasis on those that relate to the preservation and protection of Indigenous cultural heritage.
- Discuss other potential management options for inclusion in the long list and Options Assessment.

Discussions were highly productive and generally supportive of the potential management options. Feedback received from stakeholders was incorporated into the options assessment (see Section 4.1).

3.4 Stage 4

Council and DPE Review

In the first Step of the Stage 4 submission process, the First Draft CMP of this has been submitted to Council, and DPE for comment and review. At this point, those agencies that are assigned actions in the CMP will be sent a request for written support for these actions (noting that they were engaged during Stages 1 to 3 of the CMP to date).

Public Exhibition

In accordance with the CM Act, it is a mandatory requirement of the CMP process that a draft CMP be publicly exhibited for a period of not less than 28 calendar days. Water Technology will consider all responses received during the public exhibition period and prepare a reply to submissions report for Council.

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4 ACTIONS TO BE IMPLEMENTED BY COUNCIL OR BY PUBLIC AUTHORITIES

4.1 Selection of Management Actions

Stage 3 of the CMP process involved the development of management actions to address the risks and issues identified in Stage 2. A key objective of the CMP is to utilise a strategic and practical approach to developing management actions. Management actions included in the program have been rationalised and prioritised by a robust, and comprehensive decision-making framework. The framework adopted in the CMP was developed in order to make sound comparisons between each option and to rank options in a transparent and unbiased manner – in order to identify those that have the greatest overall benefit for management of the coastal zone.

Stage 2 included a detailed assessment of the various threats and risks affecting the environmental, social, and economic values of the coastal zone (Water Technology, 2023a). Subsequently, the purpose of Stage 3 was to identify coastal management options that could address coastal management issues such as threats, risks, and hazards, take advantage of opportunities, and give effect to the objectives of the CM Act. The approach to the section and assessment of options is provided in Figure 4-1.



Figure 4-1 Four steps in action identification and evaluation (adapted from the CM Manual)

4.1.1 Confirm Strategic Direction

The purpose of a CMP is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objects of the CM Act. The long-term strategic direction for the Shoalhaven LGA Open Coast and Jervis Bay is encapsulated by the vision that has been developed for the coast along with the local coastal management objectives (Section 1.3), aligned with the CM Act. These objectives have been considered by Council in the development of this CMP.

4.1.2 Identifying Options

Once the strategic direction was confirmed, the next step of the assessment was to develop a suite of potential options to address the risks identified in Stage 2 and achieve the objectives of the CMP. A "long list" of potential options was developed through the process summarised in Figure 4-2, and outlined in the CM Manual (OEH, 2018d). This included investigating prior works such as the Shoalhaven Coastal Zone Management Plan (CZMP) (Advisian, 2018a), historical studies, community and stakeholder engagement, and utilising coastal management expertise. The full long list of options assessed in the CMP is provided in the Stage 3 Report (Water Technology, 2023b).

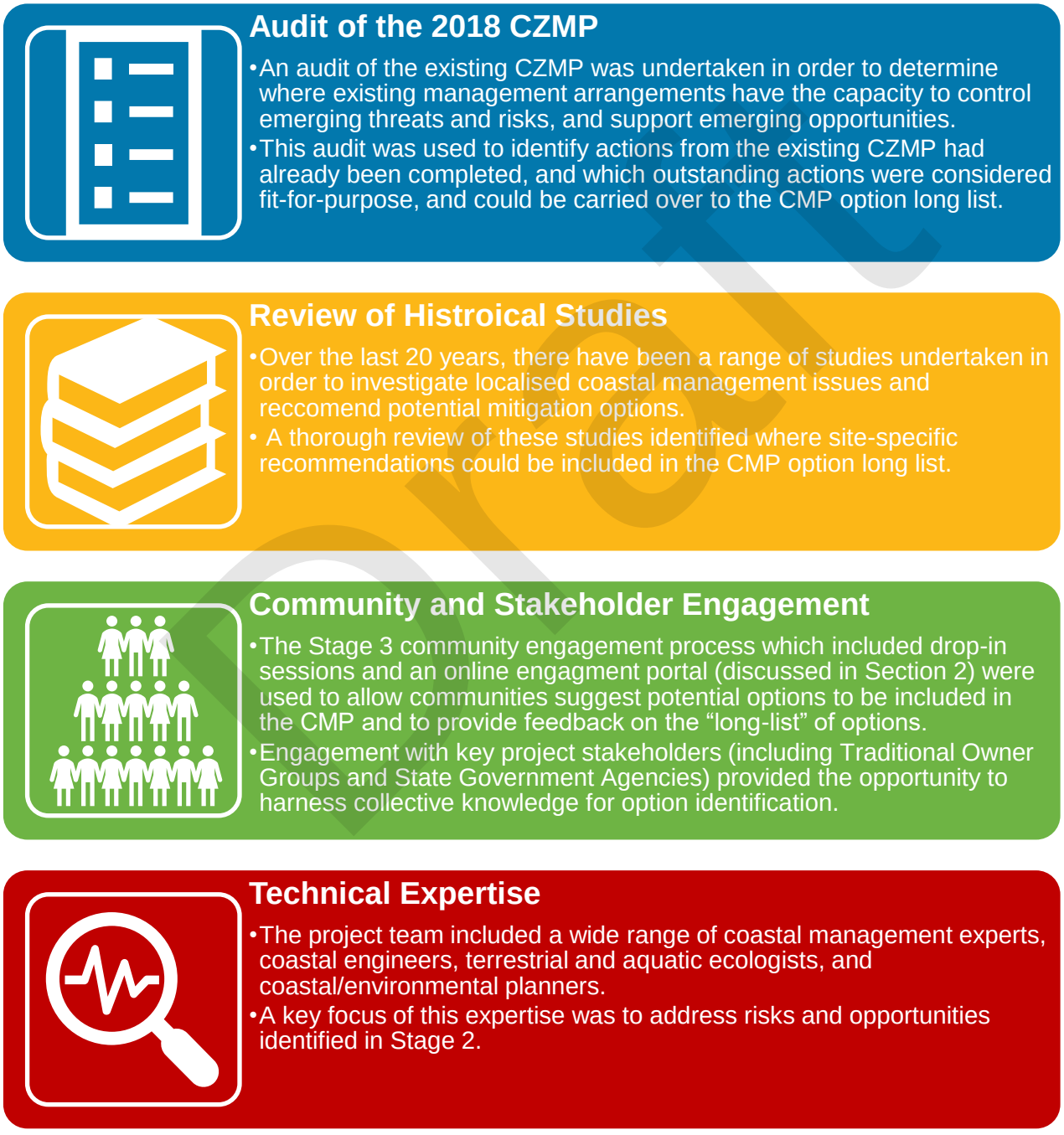

Figure 4-2 Identification of potential management options

4.1.3 Assessment of Options

Once the long list of management options was developed in Step 2 (see Figure 4-1), the next step was to assess and prioritise these options. To ensure the eventual Stage 4 program of management options are appropriate, are able to be implemented, and meet the objectives the CM Act, Stage 3 of the CMP employed a robust multi-criteria decision-making framework. Full details of the options assessment process are provided in the Stage 3 report (Water Technology, 2023b), however a brief summary has been provided herein.

The options assessment followed a 3-step process, as outlined in the CM Manual (OEH, 2018d), and summarised in Figure 4-3 below. The process includes evaluating the **feasibility**, **viability**, and **acceptability** of each potential option.

The purpose of this approach is to evaluate and choose among alternatives based on multiple criteria through a systematic analysis that uses stakeholder participation to inform economic, social, and environmental criteria. This provides a tool that enables different stakeholders' perspectives and values to be explicitly included in the analysis. This process was used as a transparent tool to help determine which options may progress to Stage 4 of the CMP.

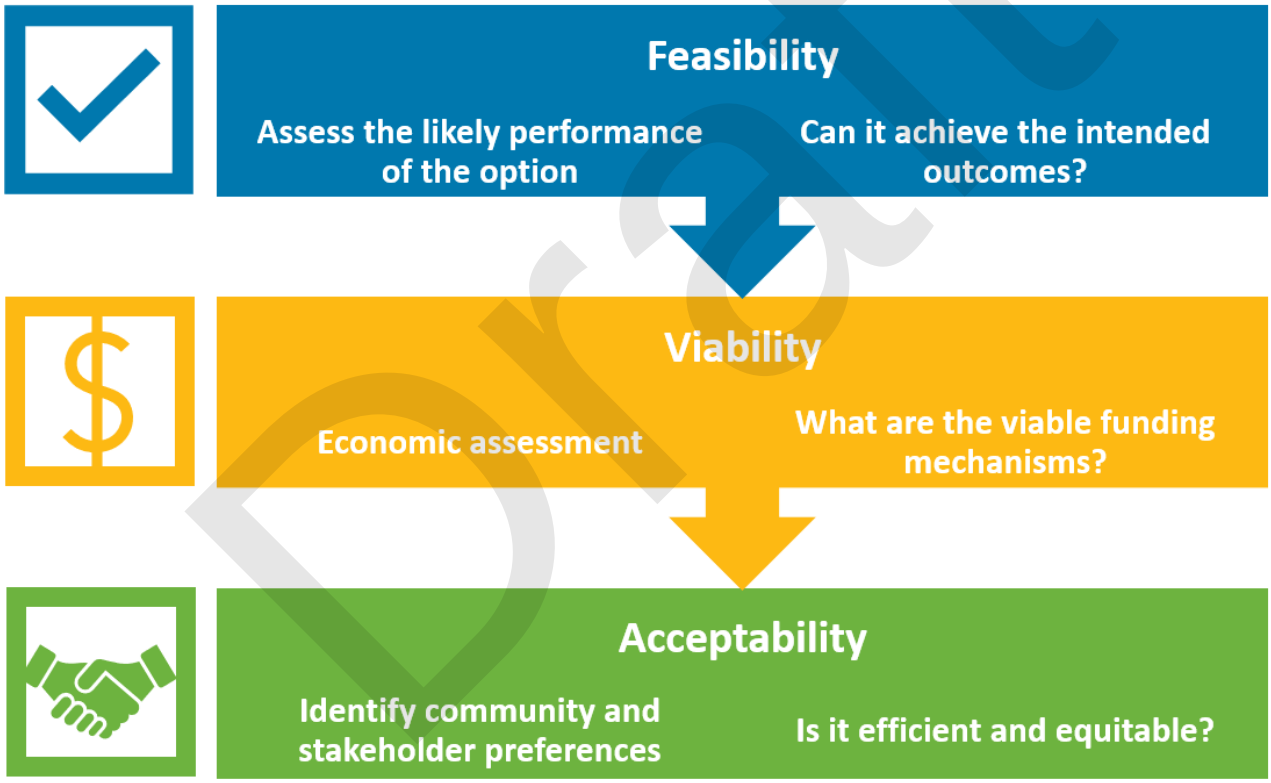

Figure 4-3 The Stage 3 options assessment process (adapted from the CM Manual)

Feasibility Assessment

The purpose of the Feasibility Assessment was to ensure that the options set out in the CMP met the feasibility criteria set out in the CM Manual (OEH, 2018d), in that they are:

- Are aligned with the objectives of the CM Act.
- Able to address the identified issues, mitigate risks, and/or or enhancing opportunities. That is, they can effectively achieve their intended outcome(s).

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- Feasible in engineering and management terms, i.e., they can be realistically implemented, given Council's available budget and resources.
- Environmentally acceptable and consistent with Ecologically Sustainable Development (ESD) principles.
- Consistent with statutory and policy requirements at Local, State and Commonwealth levels (including the CM Act, the RH SEPP, and the MEM Act).
- Adaptable, and can transition to alternative approaches when circumstances change.

The feasibility assessment investigated how each option met the above requirements, and the ability for each option to address the various risks and opportunities across the study area. Subsequently, the potential options were assessed using a high-level, semi-quantitative multi-criteria analysis (MCA) framework. For this task, a semi-quantified MCA was adopted whereby each option was assessed against the various criteria and provided a numerical score. A summary of this methodology is provided in Figure 4-4 below, and included assessment of each individual option against the following criteria:

- *The Degree of Risk Mitigation*: This provided an assessment of the degree of risk being mitigated by the option. It included consideration of:
  - The level of risk being mitigated: i.e., is the option addressing an extreme level of risk, or addressing a relatively low risk issue? These risks were assessed in the Stage 2 Report.
  - The effectiveness of the option: to account for the impact / effectiveness of the option to address the risk and achieve its intended outcome.
- *Potential Impacts on Environmental, Social, and Cultural Values:* Options were assessed considering not just their risk mitigation potential, but also for their potential impacts (both positive and negative) on the values of the study area. Categories included assessing impacts on:
  - Physical coastal processes
  - Coastal environment & biodiversity
  - Coastal & estuarine water quality
  - Social & recreational amenity
  - Public safety
  - Cultural heritage values (both tangible and intangible)

  Scores were assigned on a sliding scale from **+3 (strongly positive)** to **0 (neutral or no impact)** to **-3 (strongly negative)**. A score of -3 against any of these criteria may result in the option not being feasible.
- *Alignment with relevant legislation, policy, and plans*: To consider if the option is consistent with objects of the CM Act and all statutory and policy requirements at local, state and Commonwealth levels.

Using the formula provided in Figure 4-4 below, a Total Feasibility Score was calculated for each option. From here, a scale factor of 2.0 was applied to each of the Study-Area-Wide options. This was to acknowledge the greater geographic scale of the realised benefits for those options that apply to the entirety of the study area.

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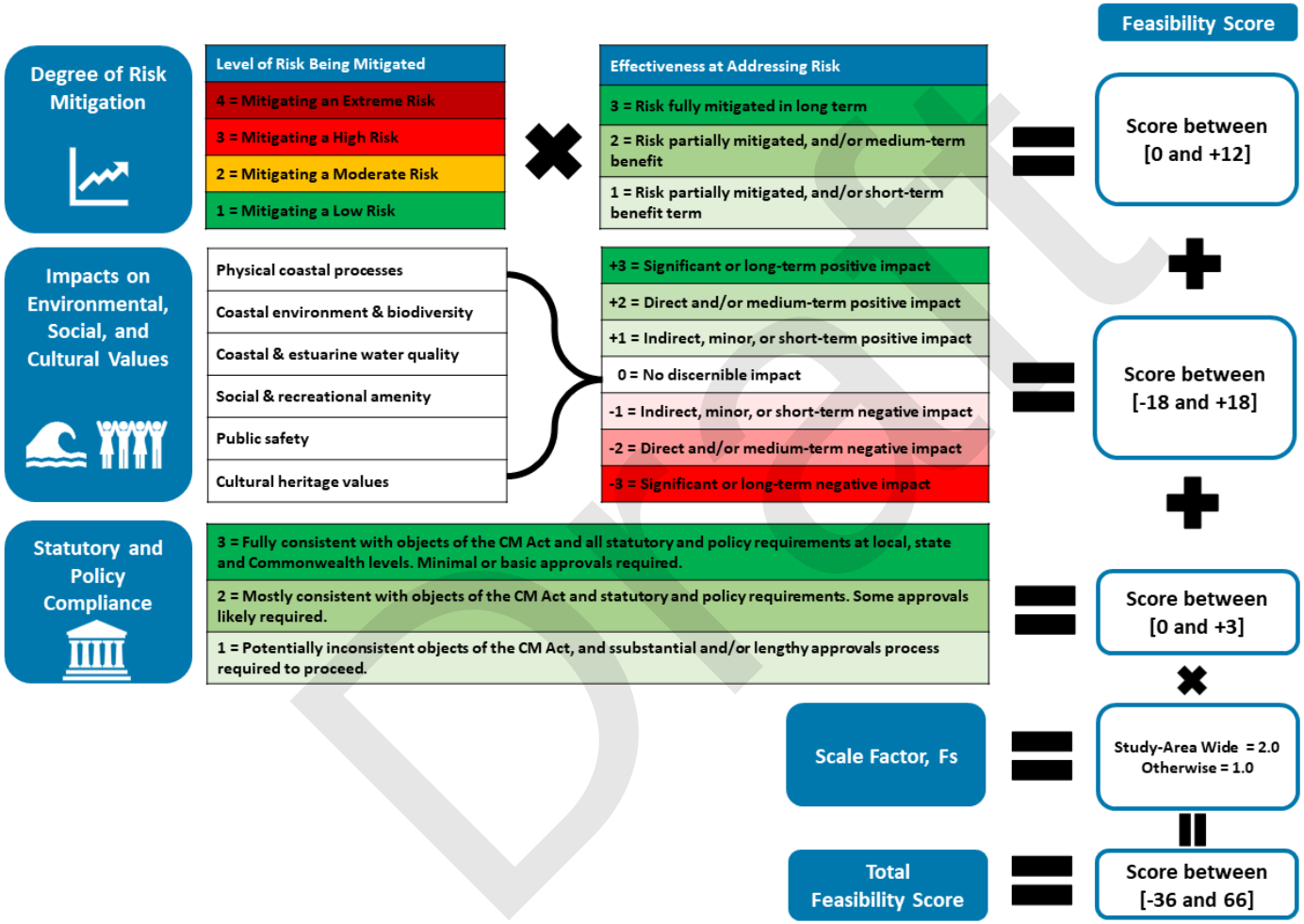

Figure 4-4 Calculation of feasibility score

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Acceptability Assessment

A key factor in the evaluation of options involved determining the acceptability of those options to 3 distinct stakeholder groups (as discussed in Section 2):

- The local communities across the Shoalhaven LGA
- Local Indigenous partners – including the Jerrinja Tribal Group, Jerrinja LALC, and the Ulladulla LALC
- Relevant public authorities, such as state government agencies.

To this end, a robust community and stakeholder engagement process was undertaken during Stage 3, and the methods and outcomes of this engagement are described in Section 3. This process allowed the communities and stakeholders to provide feedback on some of the potential management options, and to provide their suggestions and opinions regarding additional management options that could be considered in Stage 3 of the CMP.

Outcomes from the community and stakeholder engagement were used to calculate an *Acceptability Score* for each potential option. This was calculated using the method described in Table 4-1, whereby equal weighting was given to the 3 stakeholder groups.

Table 4-1 Calculation of acceptability score

Component	Description	Acceptability Score
Community Support	Community support was calculated for each option based on the percentage of community support recorded for each option from the Stage 3 community engagement portal. The percentage support was converted into a decimal to generate a score between 0 and 1.	Score between: [0 and +1]
Indigenous Stakeholder Support	Support from local Indigenous interest groups was obtained through both face to face and online engagement methods. Stakeholder support was provided as a number between 0 and 1: ▪ If an Indigenous interest group indicated that it did not support a particular option, then a score of 0 was given and the option was disqualified from progression through to Stage 4 of the CMP. ▪ If partial or conditional support was offered from any group, then a score of 0.5 was applied and conditions of support were noted to modify the option accordingly. ▪ If all groups indicated support of the option, then a score of 1 was applied. In the instance where new options were derived after the engagement period, a default score of 1 was applied, with a note to continue engagement through Stage 4. Likewise, if no indication of non-or partial support was offered, a default value of 1 was applied.	Score between: [0 and +1]
Stakeholder Support	Support from project stakeholders (comprising stage government agencies) was scored using the same process as outlined for Indigenous Interest Group above.	Score between [0 and +1]
Total Acceptability Score		**Addition of the above. Score between; [0 and +3]**

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Viability Assessment

The primary purpose of the viability assessment is to identify (for each option):

- The cost of the option
- The distribution of costs and benefits to different stakeholders
- Any proposed cost-sharing arrangements and funding mechanisms
- Whether proposed management options are affordable and therefore viable for progression through to Stage 4 of the CMP.

Subsequently, Stage 3 of the CMP provided an economic assessment of each of the potential options on the long list. As per the guidance provided in the CM Manual, the level of economic assessment was specific to the nature of each option:

- **Detailed Economic Cost-Benefit Analysis**: A more detailed probabilistic economic cost-benefit analysis (CBA) approach has been applied for options where risks and both (a) the impacts are high and (b) the economic costs and benefits can be reasonably estimated. This level of assessment was applied to 16 of the options on the long list, with the intention to calculate an economic Benefit-Cost Ratio (BCR) for each of those options. The process for this assessment is described in detail in the Stage 3 Report (Water Technology, 2023b). The CBA was undertaken in accordance with guidance set out in the. NSW Government Guide to Cost-Benefit Analysis (NSW Treasury, 2023) and the CM Manual guidelines for using cost-benefit analysis (NSW Government, 2020).
- **Preliminary Economic Assessment**: This intermediate level assessment was applied to the remaining options that did not fit the category above to warrant a full CBA. As part of the economic assessment, forward estimates were provided for the full capital, operational, and ongoing maintenance costs of potential management options. These cost estimates were developed based on:
  - Engagement with relevant stakeholders
  - The costs for historical capital works and environmental management programs, based on Council records.
  - Industry standard guidelines, such as the *Rawlinsons Australian Construction Handbook 2023* (Rawlinsons, 2023).
  - Coastal engineering and coastal management experience of the project team.

Once the 10-year net present value (NPV) cost of each option was estimated, a Viability Score was calculated for each option based on the logarithm (Base 10) of the cost. This enabled an order of magnitude cost-weighting to be applied to each option in the overall MCA. An example of the scores using the criteria is listed in Table 4-2.

Table 4-2 Viability score weighting for options

10-Year NPV cost of options	Viability Score
< $1,000	3
$1,000 < $10,000	4
$10,000 < $100,000	5
$100,000 < $1,000,000	6
> $1,000,000	7

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Options Assessment Outcomes

The output of the three-phase assessment described was the calculation of an **Options Ranking Score**, which was the arithmetic combination of the **Feasibility Score**, the **Viability Score**, and the **Acceptability Score**, as demonstrated in Figure 4-5.

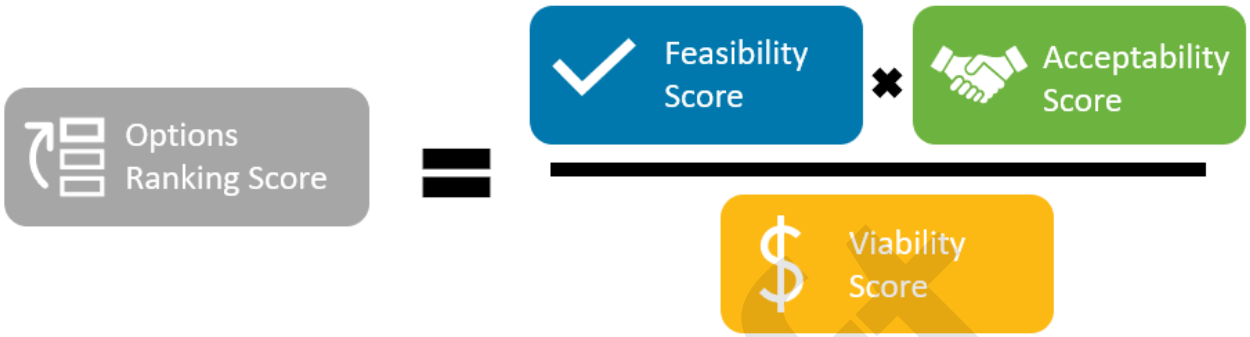

Figure 4-5 Calculation of the options ranking score

The feasibility score provided an indication of an option's ability to address the various risk across the study area (either directly or indirectly) and its impacts on the social and physical environment.

The acceptability assessment demonstrated the level of support for each of the options amongst the local community members and key project stakeholders.

The viability assessment outlined the full life-cycle costs of each option and provided a measure of economic viability and value for money.

Subsequently, the Options Ranking Score provided a numerical value that represented the holistic benefits of each option in a clear and transparent manner. This three-phased process was used to inform the development of the CMP – specifically which of the options on the long list should progress through to Stage 4 of the CMP. However, it is recognised that the Options Ranking Score contains an inherent measure of both subjectivity and uncertainty. Therefore, the Options Ranking Score was not used as a rigid or conclusive metric for which options should progress through to Stage 4 of the CMP. Some options will contain benefits that may not be easily captured by heuristic measures, or will possess an element of organisational, political, or social costs or benefits that may affect its overall favourability. Therefore, the Options Ranking score was used as a starting point for discussion with Council, and the results considered in light of Council's understanding of local knowledge of the environmental, economic, and social context. Ultimately, the total number of options that progressed through to Stage 4 was based on the budget and resource constraints of Council. Based on the process described herein, a total of 126 options progressed through to Stage 4 of the CMP. During the development of Stage 4 of this CMP, certain actions have been concatenated and consolidated for efficiency and planning purposes, resulting in a total 116 actions being included in this Stage 4 program.

4.2 Overview of Management Actions

4.2.1 Overview

The Shoalhaven LGA coastal zone comprises over 165 km of open coastline, which extends from North Durras Beach in the south, to Shoalhaven Heads in the north – and also includes Jervis Bay. Consequently, Council is tasked with delivering sustainable management of one of the largest coastal zones of any LGA in the state.

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Consequently, this CMP has been structured in a such as way that it can facilitated a large scale, coordinated approach to coastal management, whilst maintaining specific focus and granularity at a local level. The CMP structure includes:

- Seven overarching strategies for managing the entire LGA coastline. These strategies, the associated actions contained within them, are described in Section 4.3.
- Four local area plans (LAPs) that focus on discrete actions at a local beach level in order to manage localised coastal risks and threats. The actions contained within these LAPs are described in Section 4.4 to 4.7.

This structure is depicted in Figure 4-6.



Figure 4-6 The structure of this CMP – comprising 7 strategies for managing the entire coastline, and 4 local area action plans

4.2.2 Action Snapshots

Management strategies and actions have been developed for a ten-year period. A timeframe for implementation of the actions is specified, using time that is equivalent with the key Council IP&R documents, as follows:

- Year 1: to match with the Operational Plan (which typically extends for one financial year).
- Year 2 to 3: to match with the Delivery Program 2022-2026 which is a 4 year program (including the Operational Plan).
- Year 4 to 7: to match with the future Delivery Program 2026-2030.
- Year 8 to 10: to match with the future Delivery Program 2030-2034.
- The term 'ongoing' is used where an action will need to be repeated regularly, or where ongoing maintenance is required.

All recommended actions that have a specific location associated with them are shown on map series in the respective report section. All actions in this CMP only apply to areas within the legally defined coastal zone

(i.e., within one of the existing CMAs or the proposed CVA, see Section 1.2.3). The following information is provided for each action:

- Action ID.
- Location/scale of the action (where applicable for local area actions).
- Action name and description.
- The risk being addressed by this Action (refer to risk IDs provided in Table 2-3 and Table 2-4).
- Lead organisation responsible for implementation and any relevant supporting agencies.
- Priority and indicative timing of the action (see Section 4.2.3).
- Performance measures.

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.

4.2.3 Prioritisation of Actions

Given Council's limited funding and resources, a key element of CMP implementation is the prioritisation and rationalisation of management actions. This is particularly 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. This overall suite of CMPs will likely include hundreds of actions, and so a logical and coherent approach to prioritisation is needed. With this in mind, the CMP has set forth a methodology for prioritisation of management actions – based on a logical Action Priority Matrix. This considers both the **importance** and the **urgency** of each individual action in order to develop a coherent plan for prioritisation.

For this task, the **importance** of each action has been assigned a score out of ten (10) based on how critical implementing that action is towards achieving the overall goals of the CMP:

- **Critical (8-10)**: Those that are critical for addressing key risks and the long-term effective management of the coastline. These actions are critical for successful implementation of the CMP.
- **High (4-7)**: Those considered of high importance, or high impact, in addressing risks and opportunities.
- **Medium (1-3)**: Those that whilst still important, are considered to be moderately effective or impactful in terms of addressing risks and opportunities.

The second consideration is the **urgency** of the various actions. This consideration acknowledges that whilst some actions may be highly important to success of the CMP, they may not need to be (or perhaps may not be able to be) implemented immediately. This could be due to budget or resourcing limitations, or the need to schedule some actions first in order to allow others to proceed effectively, or by implementing a staged approach. The urgency of the actions has been assigned a score out of three (3) based on the following criteria:

- **Pressing (3)**: Actions that require immediate attention and implementation, or actions that affect the critical path of other actions (i.e., are a prerequisite for other actions) and therefore need to be implemented in the short term.
- **Moderate / Dependent (2)**: Actions that are of moderate urgency or are dependent on the implementation of other actions before they can commence.
- **Opportunistic (1)**: Actions that do not have an immediately pressing timeframe for implementation, but rather can be implemented opportunistically as resources and funding become available.

The Action Priority Matrix is provided in Table 4-3. It provides a process to generate a Priority Score for each action. The Priority Score can be banded in order to outline an approximate timeframe for implementation and

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alignment with Council's 4 year Delivery Program (DP) under the NSW Integrated Planning and Reporting (IP&R) Framework:

- **High Priority** (score of 24-30): To be implemented in the short term – within 1-3 years.
- **Medium Priority** (score of 8-23): To be implemented in the medium term – within 4-7 years.
- **Low Priority** (score of 1-8): To be implemented in the long term – within 8-10 years.

It should be noted that this process is intended to provide a broad indication of action priority. However, it is acknowledged that this may not marry with the "on the ground" reality over the forward CMP timeframe (Stage 5 – Implementation), and 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.

It should also be acknowledged that some of the actions whose urgency is listed as "Opportunistic" may provide an opportunity for "quick, easy wins" throughout the process, particularly those that require minimal cost or effort to implement. Therefore, Council should remain vigilant for opportunities to implement these actions as they may arise.

Table 4-3 The Action Priority Matrix

Priority			Urgency		
			Pressing	Medium / Dependant	Opportunistic
			3	2	1
Importance	Critical	10	30	20	10
		9	27 High Priority	18	9
		8	24	16	8
	High	7	21	14	7
		6	18	12	6
		5	15 Medium Priority	10	5
	Medium	4	12	8	4
		3	9	6	3 Low Priority
		2	6	4	2
		1	3	2	1

4.3 Overarching Strategies for Coastal Management

This CMP includes are 7 overarching strategies for coastal management, as depicted in Figure 4-6. Each strategy is implemented through a series of discrete management actions. These strategies include a combined total of thirty-one (31) management actions – which are detailed in Table 4-4.

The focus of these strategies, and the associated management actions, are to:

- Apply a strategic, consistent, and coordinated approach to the implementation of coastal management actions at study area wide level.
- Involve the participation of local communities and stakeholders in decision-making processes.
- Provide a focussed planning framework for coastal management, ensuring that development and resource use align with the broader goals of sustainability and protection, including during emergencies.
- Enhance the resilience of coastal communities and reduce vulnerability to natural processes.

- Provide a broad scale and coordinated approach to the protection of the coastal environment and ACH values.
- Increase efficiencies around asset management, including public assets and infrastructure.

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Table 4-4 Overarching strategies and actions for Coastal Management

ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
		Strategy 1: Integrated Coastal Zone Management						
S1.01	Establish a CMP governance framework	• Establish a CMP working group • Clearly define its purpose, objectives, and functions • Define its roles and responsibilities of its members • Execute the function of the Working Group • Meet regularly to execute CMP and track progress	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (30)	Year 1 and ongoing	Working group established and functioning.
S1.02	Establish two new Full Time Equivalent (FTE) Coast & Estuary Officer roles within Council	Establish two new Full Time Equivalent (FTE) Coast & Estuary Officer roles within Council - in order to develop the implementation strategy of Council's Open Coast and Jervis Bay CMP, (including long-term funding options) and build Council's capacity to respond.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	High (30)	Year 1 and ongoing	Roles established and maintained for 10 year CMP duration.
S1.03	Develop and execute a communications plan for Stage 5 of the CMP	Present information on Council's website and in community engagement activities that shows: • The purpose of the CMP. • The CMP background, and an overview of the NSW Coastal Management Framework. • Key CMP information, including reports available for public consumption. • The Status of CMP Actions, with details of the actions and recent updates/progress. • Information pertaining to upcoming community consultation events, and avenues for engagement; and • Links to relevant materials such as The NSW Coastal Management Framework, and the Marine Estate Management Strategy. • How coastal zone systems function and how integrated management responses benefits Council and local communities.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	High (30)	Year 1 and ongoing	Plan developed and implemented.
S1.04	Develop and implement a program to monitor key environmental parameters relevant to coastal management	This should comprise an ongoing monitoring program that includes: • Periodic beach/dune survey and shoreline monitoring • Monitoring of storm events and their impacts (including photologs) • Ecological data including dune ecology and invasive species • Include citizen science opportunities such as CoastSnap • Strategic linkages to existing monitoring programs, such as Beachwatch and BeachStat This program should be integrated into the wider Shoalhaven City Council Environmental Monitoring Program (EMP)	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	High (30)	Year 1 and ongoing	Plan developed and implemented
S1.05	Maintain and where necessary expand upon the Council's BeachStat dashboard for the Shoalhaven LGA	Maintain Council's existing BeachStat dashboard for the LGA. The BeachStat program is system to automatically track beach users and shoreline positions using low-cost remote camera systems, and machine learning algorithms. Investigate the potential to add more locations to the dashboard in the future on an as needed basis.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	Medium (21)	Year 1 and ongoing	Dashboard maintained for CMP duration. Collected data is of tangible benefit from a research and management perspective.
S1.06	Maintain and update the CoastSnap camera cradle locations across the Shoalhaven LGA	Maintain the existing suite of CoastSnap camera cradles for the LGA that covers key beaches, which possess a high level of risk associated with coastal hazards and beach change. Investigate the potential to add more CoastSnap locations. CoastSnap is a global citizen science project to capture our changing coastlines. It allows citizens to capture and upload photos of their beaches in order to improve our scientific understanding of erosion and coastal shoreline change. This action should include ongoing funding for CoastSnap image analysis, and identification of future locations for additional camera cradles. More information about CoastSnap can be found here: https://www.coastsnap.com/	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	Medium (21)	Year 1 and ongoing	CoastSnap camera cradles maintained for CMP duration. Collected data is of tangible benefit from a research and management perspective.
S1.07	Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure	This action involves the development and implementation of a monitoring program designed to assess and track the condition of various coastal assets and infrastructure, including: • Coastal protection structures (revetments, seawalls, training walls) • Recreational assets including viewing platforms & coastal access tracks • Stormwater outlets. • Sewer and water infrastructure The program should be integrated into Councils broader asset management program.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (24)	Year 1 and ongoing	Plan developed and implemented. Collected data is of tangible benefit from an asset management perspective.

ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
S1.08	Enact the CMPs Monitoring, Evaluation and Reporting (MER) Program for the CMP	This will include: • Ongoing monitoring of CMP Actions • Annual review of actions to ensure they are appropriate and current, with completed actions documented • Ongoing reporting of progress • Documentation of the effectiveness of the proposed strategies and actions will be reported as part of Council's Annual Report (which is part of the IP&R framework), including progress towards or full achievement of the performance targets included for each action.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (30)	Year 1 and ongoing	Annual reviews completed
S1.09	Continue ongoing collaboration with state government agencies and research institutions	Continue to collaborate with universities, government agencies and others in research that focuses on: • Climate change impacts on coastal processes and coastal landforms, including new data on sea level rise, storm behaviour, sediment transport processes and coastal recession modelling • Impact of sea level rise on rock platform communities • Coastal lake entrance behaviour (sediment budget, morphology, opening and closing regimes) with sea level rise and other aspects of climate change and climate variability • Ecological services and functions of dune species and most effective vegetation structure to enhance dune resilience • Assessing and monitoring the impacts of NABE works at all beaches where it's implemented	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H) DPI-Fisheries NPWS Crown Lands	Medium (10)	Year 1 and ongoing	Research output is of tangible benefit from a management perspective.
S1.10	Undertake a Feasibility Study to assess the potential for sustainable and economical utilisation of offshore sand resources for large scale beach nourishment across the LGA	Large scale beach nourishment may represent a strategic, long term management solution for coastal hazard risk for a number of "at risk" locations across the LGA. Presently, the only potential sand source identified for large scale nourishment is sand bodies located offshore - but such offshore sand sources are not currently feasible due to regulatory constraints. However, there is a possibility that the existing regulatory constraints may be lifted at some point during the CMPs 10 year life cycle. Therefore, the purpose of the study would be to: • Determine if offshore beach nourishment is feasible and economically viable; and • Undertake the necessary assessments in advance, to ensure Council can act without delay should restraints be lifted, and an opportunity arise to undertake beach nourishment in a cost effective way.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	High (24)	Within 1-3 years	Study completed.
S1.11	Monitoring of locations identified as being at risk of coastal cliff and slope instability	Undertake monitoring of locations identified as being at risk of coastal cliff and slope instability in the Stage 2 Geotechnical Report. These include: • Bendalong Point: Monitor areas of deep colluvial soils in the Dee Beach Bluff for signs of movement • Bendalong Point: Monitor slightly arcuate cracking and settlement in the western (north-bound) lane on the steep section of Manta Ray Road up Bendalong Headland • Narrawallee Beach: Continue to monitor groundwater levels and inclinometers at Surfers Avenue • Golf Course Reef Beach: Monitor soil in the Golf Course Reef Bluff for signs of movement • Ulladulla Harbour: Monitor the cracking and settlement in the access road to the Ulladulla Sea Pool at the end of Wasons Road • Depot Beach: Monitor cracking and settlement in Fairley Street pavement, adjacent to No. 30 Depot Beach Road.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (24)	Year 1 and ongoing	Monitoring undertaken and recorded. Collected data is of tangible benefit from an asset management perspective.

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ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
S1.12	Feasibility investigations, design, and approvals for addressing estuary entrance instability at Mollymook Beach, Manyana Beach, and Hyams Beach	This action involves the investigation of potential management options for addressing estuary entrance instability at three specific locations across the LGA. These options may include sand redistribution works or the potential construction "tripper walls" that would comprise small (mostly buried) Geotextile Sand Container (GSC) structures intended to prevent the meandering of creek entrances from exacerbating coastal hazard risk and negatively impacting safe beach access. The three locations identified for inclusion in this investigation include: • Manyana Beach: The northern side of the Manyana Creek entrance. To prevent the northwards meander of the creek entrance from eroding the beach in front of the public road along Sunset Strip. This would also include dune restoration work (fencing/ revegetation) to the dune and beach area located to the north of tripper wall. • Mollymook Beach: At the southern side of the Blackwater Creek entrance. It would prevent the creek mouth meandering southwards along the beach to the surf club - which exacerbates beach erosion and reduces safe beach access. • Hyams Beach: At the northern side of Hyams Creek, preventing it from meandering northwards and eroding the foreshore and increasing coastal hazard risk. The Action would be undertaken in a staged progression in order to ensure that the concepts have been investigated in detail, are proven to be effective, and would have minimal adverse environmental or social impacts. This action would include the following works: A) Investigation of the feasibility of the potential options at each location. B) Consultation with the local community & relevant stakeholders C) Concept design of the preferred solution(s) D) Undertaking required environmental assessment and obtaining necessary approvals E) Detailed design of the preferred solution(s) F) A prioritised schedule of works across all three locations Once lead agencies and supporting partners agree on the preferred management options this action will be updated to include the implementation of preferred options. This will require the CMP to be amended and re-submitted for certification.	SER12.3 SER14.3 SER.16.8	SCC	DPE(E&H) DPI-Fisheries	High (24)	Within 1-3 years	Investigations complete and clear direction for future works provided.
S1.13	Undertake a Planning Proposal to adopt a CVA	Mapping for the CVA has not been provided from the RH SEPP, and no such CVA map yet exists for the Shoalhaven LGA. Subsequently, it is the intent of Council to propose, by way of a planning proposal, the adoption of a map in indicating a CVA – which may be comprised of a combination of the following hazards across the study area, which are identified in the CM Act: • Beach erosion. • Shoreline recession. • Estuary entrance instability. • Coastal cliff or slope instability. • Coastal inundation. • Tidal inundation. • Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters. Council have mapped beach erosion and shoreline recession for relevant beaches in the LGA (Advisian, 2016), and coastal cliff or slope instability as part of Stage 2 of the CMP (Douglas Partners, 2023) as part of this CMP, with the intent that this mapping will be used to prepare a CVA. Other CMPs for specific estuaries across the Shoalhaven LGA are also currently being prepared that are to include mapping of additional coastal hazards such as coastal and tidal inundation, which council will combine as part of a single planning proposal to prepare a CVA once they are also completed. 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 sea level rise on coastal hazards.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	Medium (10)	Opportunistic	Future successful planning proposal for CVA mapping

ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
		Strategy 2: Community and Stakeholder Engagement						
S2.01	Develop and maintain an ongoing program of community engagement with coastal communities - about coastal hazard risk and the importance of coastal management	Engage with foreshore reserve property owners, residents, beach goers, and community youth around risk, environmental, cultural and social issues such as: • The value of dune vegetation (e.g. trapping wind-blown sand and maintaining dune resilience, ecological functions and buffering against coastal hazards) • Recognising Aboriginal cultural heritage on the coast • The importance of foreshore vegetation in providing shade and wind protection, filtering runoff, improving water quality and providing habitat • Managing the interface between coastal bushland and private property, including edge impacts, encroachments, garden refuse dumping, storm water discharges, vegetation retention, fire protection zones and weed management • Illegal pruning, poisoning and removal of trees, private vehicle access and illegal structures/items which restrict public use of the reserve. Enforce regulations in high conservation value areas as a priority. Education programs should be enacted every 5 years.	SER5.5 SER.6.4 SER.6.5 SER.7.3 SER.8.6 SER.10.3 SER.11.3 SER.13.8 SER.16.5 SER.17.2 SER.20.6 CHR.7 CHR.13 CHR.19 CHR.25 CHR.31 CHR.37 CHR.49 CHR.55 CHR.61	SCC	N/A	High (27)	Year 1 and ongoing	Program and materials created, and program implemented.
S2.02	Develop and maintain an ongoing program of community engagement with coastal communities about the geotechnical hazard risk and the importance of coastal management	Prepare information for landholders living adjacent to geotechnical hazards and how they can contribute to risk reduction through: • Maintaining an adequate surface drainage path into and out of the property • Draining piped storm water away from steep slopes to avoid saturation and scouring • Maintaining vegetation cover of appropriate species • Repairing leaking or broken underground drainage or sewer pipes as soon as faults are identified • Periodically inspecting the property to observe changes Education programs should be enacted every 5 years	CHR.7 CHR.13 CHR.19 CHR.25 CHR.31 CHR.37 CHR.49 CHR.55 CHR.61	SCC	N/A	High (27)	Year 1 and ongoing	Program and materials created, and program implemented.
S2.03	Provide rockfall signage for the exposed cliff lines of applicable cliffs	For the identified at-risk cliffs, install rockfall signage to improve safety around coastal cliffs. Signage should be installed at nearby formal entry/exit points to the foreshore. These locations are identified in the Stage 2 Geotechnical Hazard Study Report, and include: • Crookhaven Head (below the Nursery) • Culburra (Penguin Head) • Callala Bay • Vincentia (Plantation Point) – particularly around the exposed cliff lines opposite Vincent Street, Twyford Street, Plantation Point Parade and Elizabeth Drive and around Plantation Point. • Hyams Point: • Berrara Headland • Bendalong (Red Head) • Manyana (Inyadda Point) • Mollymook Beach (Bannisters Point) • Ulladulla (Ulladulla Head and Wardens Head) • Rennies Beach Bluff • Racecourse Beach Bluff • Dolphin Point • Depot Beach Headland	SER.6.1 SER.8.4 SER.9.2 SER.11.2 SER.12.2 SER.13.2 SER.14.2 SER.15.2 SER.16.3 SER.18.3 SER.19.2	SCC	N/A	High (24)	Within 1-3 years	Signage installed.

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ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
		Strategy 3: Emergency Planning and Response						
S3.01	Activate the "Coastal Hazard Emergency Action Sub-Plans" (CZEAS) for each beach as required after storm events	Activate the "Coastal Hazard Emergency Action Sub-Plans" for each beach and coastal headland as required after storm events - and prepare resources and collaborate with relevant Council staff about the plans. Typical works after a storm event would include: • Remediation: Where beach erosion has caused a large escarpment/ drop off (>1 m) that presents a risk to assets or has created unsafe access, Council will take action to make the area safe through beach scraping. • Restoration: Arrange for permanent repair/removal of damaged assets or the rehabilitation of the environment. • Remove: Removal of beach/storm debris that poses high risk to public safety in line with Council's Foreshore Reserves Policy (POL12/304).	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H) NSW SES	High (30)	Year 1 and ongoing	Plans activated and implemented in a timely manner when needed.
S3.02	Develop a Tide Alert Calendar, and encourage citizen science in monitoring tidal inundation	The study area coastline is currently exposed to tidal inundation risk (sunny day flooding), with increasing vulnerability to this risk over time due to future Sea Level Rise. As the tides can be predicted many years in advance, this action involves development of a "Tide Alert" Calendar, and a public engagement program. It specifically includes: A) The creation of a Tide Alert Calendar: This would be a simple and practical tool that clearly communicates dates of higher-than-normal high tides to indicate when low-lying land is particularly vulnerable to tidal inundation and coastal flooding. Red-alert tide calendars are highly visual and easily interpreted, and do not require technical expertise or interpretation of large amounts of data or text. B) Public awareness and citizen science: This initiative would focus on public engagement and awareness around the highest red-alert days each year, encouraging citizens to "snap the coast" at the designated time of the high tide and upload the photograph to Councils social media channels or a Council web repository. This kind of public engagement initiative allows both Council and the local community to utilize these red-alert tide days and visualize the impacts rising sea levels may have on their communities in the future.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	Medium (14)	Year 1 and ongoing	Calendar developed, and communication system implemented.
		Strategy 4: Planning and Adaptation						
S4.01	Review Councils coastal management planning policies every 10 years	Review Councils coastal management planning policies for the 10 year CMP implementation lifecycle. This should include consideration of the latest environmental data, observed coastal hazard impacts and state government policies. The review should consider: • The Shoalhaven City Council Sea Level Rise Framework • The Shoalhaven City Council Coastal Hazard Mapping	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	Medium (10)	Year 10	Review completed.
S4.02	Maintain planning controls to reduce future coastal hazard impacts	Implement and maintain planning controls in: • The Shoalhaven Local Environmental Plan (LEP) 2014: Maintain appropriate zoning in the LEP to protect frontal dune systems and enhance resilience to coastal hazards. • Shoalhaven Development Control Plan (DCP) 2014 G6 Coastal Management Areas, which require specific information and assessment for proposed development in coastal hazard areas. Update and maintain notation to section 10.7 (5) certificates for properties affected by coastal hazards consistent with NSW Government legislation. Wherever possible, use zoning and planning controls in the DCP 2014 to maintain open spaces where coastal dunes and associated habitats can roll landward in response to climate change and sea level rise. On the open coast, this management action is linked to planning for vegetated foreshore reserves on coastal dunes.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	Medium (10)	Year 1 and ongoing	LEP 2014 and DCP 2014 maintained. Future revisions of these plan contain equivalent planning controls.
S4.03	Fill information gaps in Council's existing coastal hazard mapping dataset	There are numerous beaches across the LGA where formal coastal hazard mapping does not exist, and therefore Chapter G6 of the DCP does not apply to potential coastally adjacent development. In order to inform future development in the coastal zone, the gaps in this coastal hazard mapping should be filled by undertaking localised hazard assessment for the following beaches: • Callala Bay (see Action CL.01) • Nelsons Beach • Bawley Beach • Cormorant Beach • Gannet Beach • Racecourse Beach (southern) • Kioloa Beach • Merry Beach • North Durras Beach (and the Durras Lake Estuary Entrance) For consistency, the study should utilise an methodology that is consistent with that used to develop Council's existing coastal hazard mapping dataset.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (30)	Within 1-3 years	Study completed.

ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
		Strategy 5: Protection of the Coastal Environment						
S5.01	Continue Councils program of mapping threatened ecological communities (TECs) across coastal reserves	Continue to carry out existing survey program to ground-truth and map the distribution and condition of TECs in coastal erosion risk areas using the Biodiversity Conservation Act, Biodiversity Assessment Methodology.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	High (24)	Within 1-3 years	Mapping completed.
S5.02	Maintain and enhance ecological communities in coastal reserves (including dunes), considering appropriate ecological strategies for urban (foreshore recreation reserve) and non-urban areas	This action includes the ongoing implementation of ecological restoration works in coastal reserves with reference to the objectives of the associated coastal management areas. Prioritisation will be given to areas that comprise areas of Coastal Wetland and Littoral Rainforest and/or house threatened ecological communities (TECs), and targeted weed species control works.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	DPE(E&H)	Medium (16)	Year 1 and ongoing	Restoration works successfully implemented.
S5.03	Engage with SLSCs in order to develop a suite of dune vegetation management plans for the coastal dunes in front of all SLSC building and lifeguard towers on patrolled beaches	This will involve developing and updating existing dune vegetation management plans for every SLSC across the LGA. The goal will be to maintain immediate sight lines at surf patrol locations (to maintain public safety), whist also maintaining appropriate coverage of dune vegetation to promote dune stability and minimise loss of sand from the littoral systems that would contribute to long term recession of the beach.	SER.5.2 SER.5.4 SER.7.3	SCC	N/A	Low (6)	Within 1-3 years and ongoing	Plans developed.
		Strategy 6: Protection of Cultural Heritage						
S6.01	Undertake a LGA wide coastal zone Aboriginal Cultural Heritage Survey, and development of local protection/management plans	This action involves engaging with the relevant Local Aboriginal Land Councils, Traditional Owner groups and an archaeologist to undertake an updated cultural heritage survey of the coastal zone – and in doing so fill existing information gaps within the LGA-wide Aboriginal Cultural Heritage Mapping and updating the Aboriginal Heritage Information Management System (AHIMS). It is anticipated that there would be three main tasks for this action: • Consultation with the relevant Local Aboriginal Land Councils and Traditional Owners and knowledge holders. • An Aboriginal cultural heritage assessment, which should include survey field work, and recording of cultural heritage sites (such as middens sites) and detailed documentation of findings. • The development and prioritisation of local, site specific management plans for protection and preservation of these sites.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	Jerrinja LALC Jerrinja Tribal Group	High (30)	Year 1 and ongoing	Consultation conducted, survey undertaken, and plan developed.
S6.02	Engage with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to develop a cultural educational and awareness program	Engage with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to develop and roll out a cultural educational and awareness program - related to the Aboriginal Cultural Heritage (ACH) of the coastal zone. Design of the program should be led by either relevant Local Aboriginal Land Councils or local TO groups, that could involve educational methods such as: • School programs including planting days, stewardship sites and hands on activities • Signage at local sites such as beaches, estuaries, and headlands (including the use of QR codes that includes elders speaking about the history of the area) • Brochures and information provided to tourists at caravan parks and information centres. • Cultural tours to provide greater awareness of ACH values to both the local community and to the large population of seasonal visitors	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	Jerrinja LALC Jerrinja Tribal Group Ulladulla LALC	Medium (20)	Within 1-3 years, and ongoing	Program developed and being implemented.
S6.03	Provide opportunities and help build capacity to local Aboriginal Ranger programs, to enhance their role in management of Sea Country across the LGA	Work with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to bolstering existing ranger programs and facilitate a greater role for these programs in coastal management across the Shoalhaven LGA. • This will involve working with and supporting the ranger team coalition to help enhance/ boost their capacity and awareness of coastal management. • Where possible, utilise Aboriginal ranger teams (in conjunction with other suitable land rehabilitation contractors) to undertake on ground works associated with dune restoration and monitoring programs. • Work collaboratively to help develop the next generation of junior rangers to be a part of future coastal management across the Shoalhaven LGA. This action is consistent with Initiative #4 of the NSW Marine Estate Management Strategy – which includes Increase Aboriginal participation in Sea Country management, planning and monitoring through employment and training of Aboriginal people at a regional and local level.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	Jerrinja LALC Jerrinja Tribal Group Ulladulla LALC	Medium (9)	Opportunistic, within 10 years	Capacity of local ranger teams increased. Increased role for TO Groups in coastal management across the LGA.

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ID	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority (Score)	Timing	Performance Measures
		Strategy 7: Asset Management						
S7.01	Review and update all Council asset management plans (AMPs), relevant to the coastal zone	Review and update all asset management plans (AMPs), relevant to the coastal zone. • AMPs by asset type will be updated by relevant asset custodian. • Include an asset management approach to provide for replacement, relocation or retrofitting of public assets that are currently in coastal risk areas including surf clubs and sewer, water and sewerage infrastructure, foreshore protection infrastructure, roads and access paths. • Align the asset management plans with emergency action sub-plans. This action includes continuing to implement high priority stormwater management recommendations from the Coastal Erosion Stormwater Impact Assessments in 2015 and 2023.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	High (27)	Year 1 and ongoing	Plans updated and fit for purpose.
S7.02	Implement high priority (and other relevant) actions from the hydraulic assessment report to manage stormwater drainage adjacent to or within identified coastal cliffs and slopes risk areas	The Shoalhaven Hydraulic Impact Assessment Report has included an assessment of Council's stormwater drainage network across ten (10) high-risk coastal cliffs and slope areas. The project covers identification of existing/potential stormwater runoff issues that may trigger cliff and slope instability issues, development of hydrological and hydraulic models and assessment of suitability of the current network based on design and capacity. The report has detailed a number of recommendations including modification and upgrades to the local stormwater network, with the impact each option has in reducing stormwater runoff in these high risk areas quantified and assessed through a multi criteria analysis. The recommendations of this report should be implemented through the CMP as a key measure to reduce the risk of coastal cliff and slope instability in high risk areas.	SER.6.1 SER.8.4 SER.9.2 SER.11.2 SER.12.2 SER.13.2 SER.14.2 SER.15.2 SER.16.3 SER.18.3 SER.19.2	SCC	N/A	High (27)	Year 1 and ongoing	Recommendations implemented.
S7.03	Shoalhaven Open Coast Boating Infrastructure Plan	This Action involves the development of a strategic plan to help Council to manage (and invest in) its boating facilities across the Open Coast and Jervis Bay CMP study area. It could include the following components: Baseline Assessment: •Desktop Audit: Identify all Council managed boating infrastructure in the study area, including boat ramps, wharfs, jetties, and pontoons. This can also include supporting infrastructure such as dinghy storage, fish cleaning facilities, parking etc. •Inspection: Undertaking detailed condition inspections for each ramp, clearly identifying where structural and/or public safety issue may exist. •Conditions / Operability: A review of environmental conditions at each boat ramp & wharf (including tide, wind and wave conditions) •Safety: A review of TfNSW and Marine Rescue incident databases to identify potential public safety issues at each ramp. Needs Analysis: •User & community consultation: To help assess the frequency and nature of use of the facilities •Use Analysis: Including a review of the NSW DPI state-wide survey of recreational fishing, and the Regional Boating plans (such as the South Coast Boating Network Plan) – in order to broadly assess current usage and future trends for use of the facilities. •Boat Ownership & Registration: Assessment of the TfNSW data relating to general boat licences, personal water craft licences, personal watercraft registrations, recreational vessel registrations Strategic Plan: •Development of a list of asset management recommendations - including a prioritized and costed list of actions for monitoring, maintaining, or refurbishment / upgrades of facilities. Outcomes should be consistent with the South Coast Boating Network Plan from TfNSW. Upon completion, Council should seek suitable sources of funding for the strategy and its implementation, and this may include programs administered by TfNSW for boating infrastructure.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	TfNSW	Medium (12)	Within 4-7 years	Plan developed. Funding applications submitted.
S7.04	Continue the ongoing implementation of the Shoalhaven Beaches Asset Management Strategy and incorporate into the relevant SCC Asset Management Plan	Continue the ongoing implementation of the of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021) and findings from contemporary monitoring and inspections by Council (2023) for the approximately 250 beach access tracks located across the 40 Council managed beaches of the LGA. Findings have recommended Council undertake works to maintain, repair, upgrade and rationalise a number of beach access tracks. Specific recommendations have been incorporated into the options assessment under the Local Area Actions.	Action addresses a wide array of risks at a Study Area Wide scale.	SCC	N/A	Medium (14)	Year 1 and ongoing	Over 50% of findings implemented within 10 year CMP cycle.

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4.4 Local Area Plan: Northern LGA

Overview	
Area Coverage	The LAP for the Northern zone of the Shoalhaven LGA covers the area extending from Shoalhaven Heads in the north, to the Beecroft Peninsula in the south. The LAP covers the following beaches and their adjoining headlands: ■ Shoalhaven Heads ■ Culburra Beach ■ Warrain Beach ■ Currarong Beach The beaches are generally long, highly exposed east facing beaches, with flat slopes and well developed dune systems. These beaches are punctuated by major headland features including Crookhaven Heads and Penguin Head.
Key Environmental Features	The coastline in the LAP also includes two major estuaries – including the Shoalhaven River, which has a permanent entrance at Crookhaven Heads and an intermittent entrance at Shoalhaven Heads, and Wollumboola Lake which has an intermittently open entrance south of Warrain Beach. Much of the coastline in this area is comprised of undeveloped coastal reserve, including NPWS managed coastline of Seven Mile Beach National Park, Comerong Island Nature Reserve, and Jervis Bay National Park. Jervis Bay Marine Park extends into the coastal waters off Currarong Beach.
Local Population Centres	■ Shoalhaven Heads ■ Culburra Beach ■ Currarong
Mapping References	■ An overview of this area is provided in Appendix A ■ Mapping provided in Figure 4-11 and Figure 4-12 indicates the location of those actions that apply to a singular, discrete location. ■ Actions that are generic in nature or apply to an area more broadly have not been mapped. ■ Actions that related to repair, upgrade or closure of beach access tracks are mapped in Appendix E. The works identified for the beach access tracks represent an assessment based on present day conditions. The works and beach access tracks requiring works may be subject to change and Council will continue to reassess track condition into the future to scope, plan and prioritise the required works.
LAP	■ There are 11 Actions in the Northern LGA LAP ■ These actions are detailed in Table 4-5.

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Quick Reference Image Gallery



Figure 4-7 Shoalhaven Heads in 2019. Image source: SLSC



Figure 4-8 Culburra Beach in 2023. Image source: Council



Figure 4-9 Warrain Beach in 2023. Image source: Council



Figure 4-10 Currarong Beach in 2021

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Table 4-5 Northen LGA LAP

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
SH.01A	Shoalhaven Heads	SLSC Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	Undertake a formal condition inspection of the rock revetment in front of the Shoalhaven Heads Surf Club if and when it's exposed during a major storm. The revetment was designed and constructed following the 1970s storms, and assets such as rock armoured revetments require periodic inspection and assessment of maintenance requirements. The outcome of this assessment should be a clear understanding of the nature and extent of maintenance works required to maintain the intended level of protection and function over future timeframes.	CHR.4 CHR.5	SCC	N/A	Medium (9)	Opportunistic, within 10 Years	Condition inspection completed, and requirements for maintenance clearly defined.
SH.01B	Shoalhaven Heads	SLSC Coastal Protection Works - Stage 2: Maintenance Works	Based on the information provided in the revetment condition assessment (Action SH.01), undertake the required maintenance and make-safe works for the rock revetment - in order to provide ongoing protection to the SLSC building and car park.	CHR.4 CHR.5	SCC	N/A	Low (7)	Triggered by Action SH.01A	Maintenance works completed.
SH.02	Shoalhaven Heads	Opportunistic nourishment of Shoalhaven Heads beach	Develop a plan for reuse of excavated 'dry notch' (flood notch) sand, and other suitable sand resulting from any potential entrance management or dredging works at the river entrance for the low dune crest locations along Shoalhaven Heads beach - to increase the volume of the beach and dunes, and provide interim protection from large southerly waves during storms.	CHR.4 CHR.5 SER.5.1 SER.5.5	SCC	N/A	Low (7)	Opportunistic, within 8-10 Years	Program developed and being implemented, as needed. Works considered to be of tangible benefit in terms of improving coastal hazard resilience, and public safety, and recreational access.
SH.03	Shoalhaven Heads	Monitor performance of the SLSC dune restoration works	Monitor the performance of the dune restoration works at the Shoalhaven Heads SLSC. Monitor for signs of any potential recurrence of dune blowouts and undertake dune restoration maintenance works as necessary.	SER.5.1 SER.5.2 SER.5.3 SER.5.4 SER.5.5 SER.5.6 SER.5.7	SCC	N/A	Low (7)	Year 1 and ongoing	Monitoring performed and recorded within Council system.
CH.01	Crookhaven Heads	Install drainage along the downslope side of roads and tracks to minimise overland flow erosion near the Community Nursery	Install drainage along the downslope side of roads and tracks (e.g. kerb and guttering) to minimise overland flow erosion near the Community Nursery, in order to reduce prolonged or excessive saturation of the soil erosion due to uncontrolled runoff. This would reduce the risk of coastal cliff and slope instability.	CHR.10 CHR.12	SCC	N/A	Medium (14)	Within 4-7 years	Works completed.
CU.01	Culburra Beach	Passive relocation of northern access loop road when damaged by storm events - to a more landwards location within existing parcel	This action includes undertaking an investigation into the potential relocation of northern access loop road and car park when/if the structure is damaged by storm future storm events. Relocation should be to a more landwards location within existing lot/parcel. Planning analysis indicates that there is sufficient room to accommodate this.	CHR.10 CHR.12	SCC	N/A	Low (7)	Opportunistic, or within 8-10 Years	Investigation undertaken, and adaptation plan ready to implement as needed.
CU.02	Culburra Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.11 SER.6.3	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CR.01	Currarong Beach	Shoreline erosion protection structure at Beecroft Parade - Undertake investigations, detailed design, and approvals	This action includes continuing to progress the design and construction of a shoreline protection structure (such as a rock armoured seawall) that covers a section of public foreshore along Beecroft Parade, between Dolphin Reserve and the boat ramp accessway. A concept design of this structure was prepared as part of the Currarong Coastal Erosion Protection Technical Design Report (RHDHV, 2017), which provided the planform layout and cross-sectional concept designs for the potential structure. This project would be executed in three stages. Stage 1 of this Action would therefore involve the following steps: • Geotechnical investigation: Investigation of the subsurface conditions to the east of Currarong Creek (at, and behind the proposed structure footprint) to determine if the subsurface profile comprises sandy soils or less erodible rocky bedrock strata. This would inform the development of the concept design of the structure. If this investigation provided new information that indicated that the structure is not required, then there would be no need to progress any further. • Finalisation of the concept design based on outcomes of the geotechnical Investigation • Community and stakeholder engagement • Detailed design of the structure Once lead agencies and supporting partners agree on the preferred management options, and designs are completed (if required), then this action will be updated to include the implementation of preferred options. This will require the CMP to be amended and re-submitted for certification.	CHR.19 CHR.20 CHR.21 CHR.22 CHR.23 CHR.24	SCC	DPE(E&H)	High (27)	Within 1-3 years	Investigations completed, and clear direction for remaining stages established.
CR.02	Currarong Beach	Investigate and finalise options to manage long term coastal hazard risk at Currarong Beach	This action involves the investigation of a series of potential management option to address the long term coastal hazard risk at Currarong Beach. It would be undertaken in a staged progression in order to ensure that the potential solution has been investigated in detail, is proven to be effective, and would have minimal adverse environmental or social impacts. Part 1: Coastal Processes Investigation: A desktop investigation is required to identify and quantify the local sediment transport sources, sinks, and pathways. This investigation should build on the work undertaken by Royal HaskoningDHV (2017), and enhance this work through the application of numerical modelling methods comprising wave, hydrodynamic, and morphological modelling. Crucial to this task will be to determine the magnitude and direction of alongshore transport, and to develop a quantified conceptual morphological model of the Currarong Beach area - in order to determine the most effective long term mitigation option. This study should also include an investigation into feasible sand sources to supply any potential long term beach nourishment program for Currarong Beach. Part 2: Assessment of Management Options: The outcomes of the study would then inform decision making around management actions. Specifically, this part of the study should assess the following potential management options: A) Beach Nourishment - including through the sources of sand identified in Part 1. B) A potential groyne structure(s), as per the preliminary investigation of RoyalHaskoningDHV (2017). This should also include an assessment of the potential optimised groyne configuration (in terms of the number of groynes, spacing, location, length, orientation - with and without associated nourishment). C) Potential negative impacts (i.e. downdrift, or on the local estuary morphodynamics). This assessment should specifically incorporate the use of morphological modelling to assess the relative performance and potential impacts (i.e. downdrift, or on local estuary morphodynamics) of the options. Once lead agencies and supporting partners agree on the preferred management options this action will be updated to include the implementation of preferred options. This will require the CMP to be amended and re-submitted for certification.	CHR.19 CHR.20 CHR.21	SCC	DPI-Fisheries Crown Lands DPE(E&H)	High (27)	Within 1-3 years	Investigations completed, and clear direction for remaining stages established.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CR.03	Currarong Beach	Wastewater Management Plan	Develop a wastewater overflow management strategy for Currarong Creek, in order to determine the optimised operational pathways for dealing with inundation under future sea level rise scenarios. Options include relocation of the structures, raising the structures, and/or flood proofing.	SER.8.3	SCC	N/A	Medium (14)	Within 4-7 years	Strategy completed, providing recommendations and pathways for management of the assets.
CR.04	Currarong Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.23 SER.8.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.

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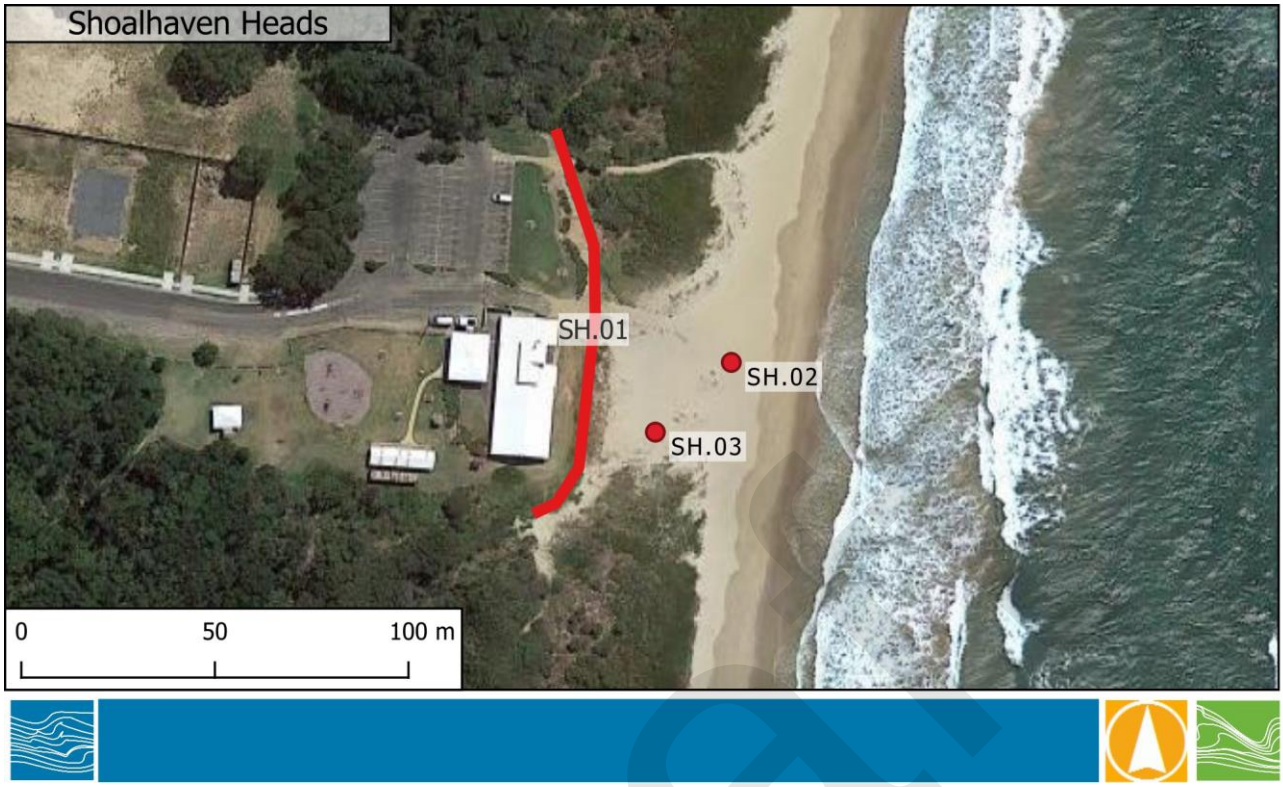

Figure 4-11 LAP Action locations for Shoalhaven Heads

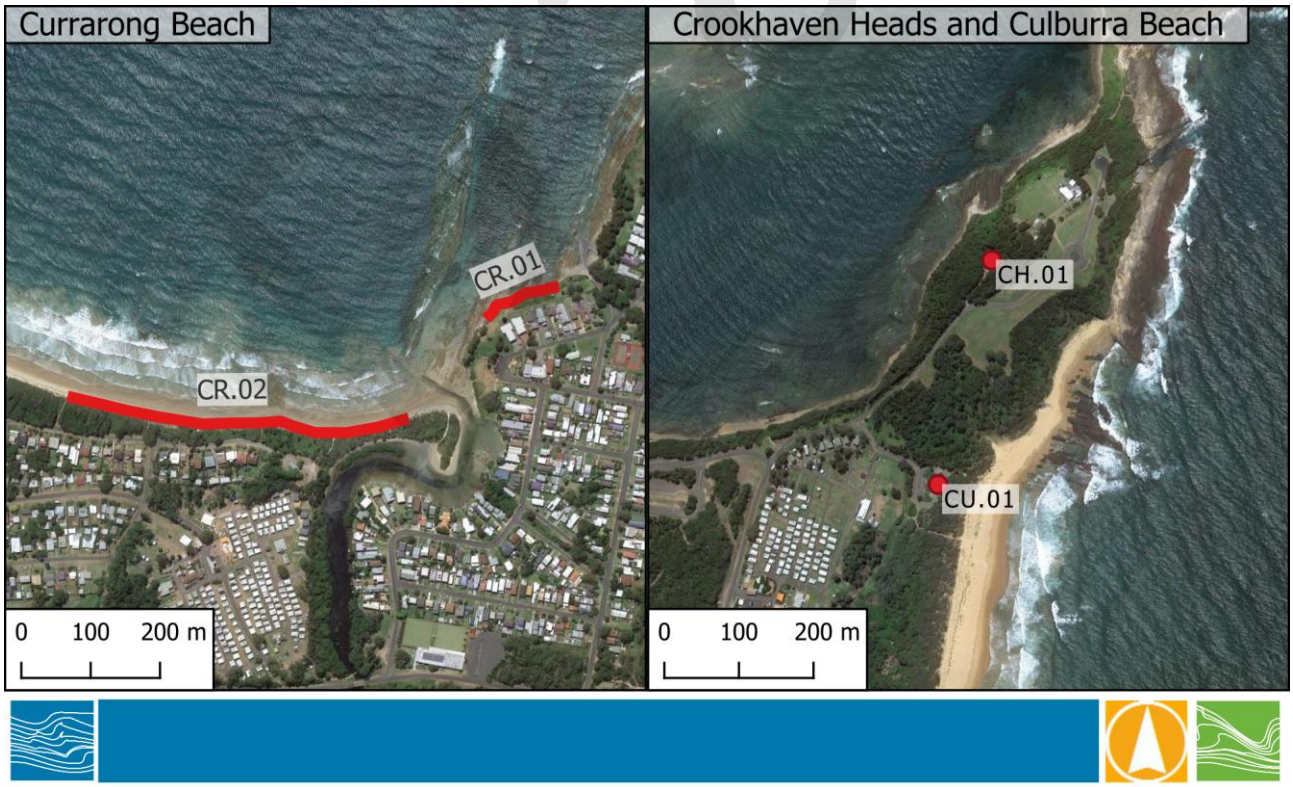

Figure 4-12 LAP Action locations for Currarong (left) and Culburra Beach / Crookhaven (right)

4.5 Local Area Plan: Jervis Bay Area

Overview	
Area Coverage	The LAP for the Jervis Bay Area of the Shoalhaven LGA covers the Council managed area of the Jervis Bay coastline. The LAP covers the following beaches and their adjoining headlands: ■ Callala Bay ■ Callala Beach ■ Shark Net Beach ■ Huskisson Beach ■ Collingwood Beach ■ Orion Beach ■ Barfleur Beach ■ Nelsons Beach ■ The small pocket beaches of Blenheim Beach, Greenfield Beach, Chinamans Beach, and Little Hyams Beach ■ Hyams Beach The LAP does not cover land managed by the Federal Government – including The Jervis Bay Territory, which is a Commonwealth-administered territory occupying the Bherwerre Peninsula and forming the southern boundary of Jervis Bay (and included Booderee National Park).
Key Environmental Features	The coastline in the LAP is intersected by the estuaries of Wowly Creek, Currambene Creek, and Moona Moona Creek, as well as a series of small creek and drainage outlets. Much of the coastline in this area is comprised of undeveloped coastal reserve, including NPWS managed coastline of Jervis Bay National Park. The Jervis Bay Marine Park extends across all NSW coastal waters within Jervis Bay.
Local Population Centres	■ Callala Bay ■ Callala Beach ■ Huskisson ■ Vincentia ■ Hyams Beach
Mapping References	■ An overview of this area is provided in Appendix A ■ Mapping provided in Figure 4-19 to Figure 4-22 indicates the location of those actions that apply to a singular, discrete location. ■ Actions that are generic in nature or apply to an area more broadly have not been mapped. ■ Actions that related to repair, upgrade or closure of beach access tracks are mapped in Appendix E. The works identified for the beach access tracks represent an assessment based on present day conditions. The works and beach access tracks requiring works may be subject to change and Council will continue to reassess track condition into the future to scope, plan and prioritise the required works.
LAP	■ There are 26 Actions in the Jervis Bay LAP ■ These actions are detailed in Table 4-6.

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Quick Reference Image Gallery



Figure 4-13 Callala Bay in 2023. Image source: CoastSnap



Figure 4-14 Callala Beach in 2021



Figure 4-15 Huskisson Beach in 2021



Figure 4-16 Collingwood Beach in 2022. Image source: Council

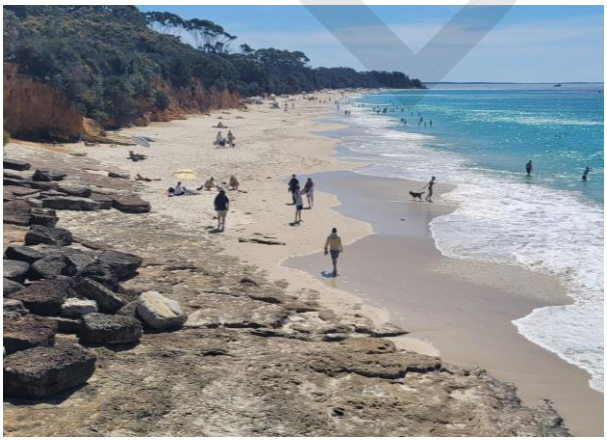

Figure 4-17 Nelsons Beach in 2023. Image source: CoastSnap



Figure 4-18 Hyams Beach in 2021

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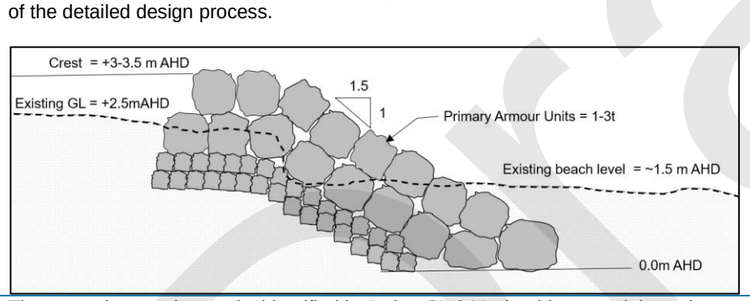
Table 4-6 Jervis Bay Area LAP

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CL.01	Callala Bay	Callala Bay Coastal Processes and Hazard Definition Study and Management Option Investigation	Undertake a coastal processes and coastal hazards study of the Callala Bay foreshore area. The primary objective of this study would be to develop a greater understanding of the alongshore and cross-shore morphological processes that can support the scientifically based derivation and assessment of coastal management solutions. The study would include three key components: Part 1: Coastal Process Investigation: A desktop investigation is required to identify and quantify the local sediment transport sources, sinks, and pathways. This investigation should build on the work undertaken by Royal HaskoningDHV (2012), and enhance this work through the application of numerical modelling methods comprising wave, hydrodynamic, and morphological modelling. The outcomes of the study would be: A) A quantified conceptual model of local sediment transport, including longshore sediment transport rates and the relative contribution of longshore and cross-shore processes to shoreline change at the study area. B) An assessment of storm erosion, and derivation of coastal hazard lines for the Callala Bay foreshore; and C) Determine the foreshore buffer required to protect private and public property. D) This study should also include an investigation into feasible sand sources to supply any potential long term beach nourishment program for Callala Bay. Note that during Stage 3 of the CMP, NPWS has indicated that it will not accept winning of sand from within NPWS land tenure to the north of Wowly Creek. Part 2: Assessment of Management Options: The outcomes of the study would then inform decision making around management actions. Specifically, this part of the study should assess the following potential management options: A) Beach Nourishment - including through the sources of sand identified in Part 1. B) A potential groyne structure(s), as per the preliminary investigation of Royal HaskoningDHV (2012). This should also include an assessment of the potential optimised groyne configuration (in terms of the number of groynes, spacing, location, length, orientation - with and without associated nourishment). C) Potential negative impacts (i.e. downdrift, or on the local estuary morphodynamics). This assessment should specifically incorporate the use of morphological modelling to assess the relative performance and potential impacts (i.e. downdrift, or on local estuary morphodynamics) of the options. Once lead agencies and supporting partners agree on the preferred management options this action will be updated to include the implementation of preferred options. This will require the CMP to be amended and re-submitted for certification.	CHR.25 CHR.26 CHR.27 CHR.28 CHR.29 CHR.30	SCC	DPE(E&H) NPWS DPI-Fisheries	High (24)	Within 1-3 years	Investigations completed, and clear direction for remaining stages established.
CL.02	Callala Bay	Callala Bay foreshore restoration	This Action involves the restoration and revegetation of the foreshore along Progress Park, in between the boat ramp and Sheaffe Street. This should include: • An ongoing program of beach scraping / sand redistribution works to increase the volume of the upper beach profile along the foreshore. • Replacing the existing lawn vegetation at the seawards end of in progress park (seawards of the walking path) with more appropriate dune vegetation, in order to improved resilience of foreshore to long term erosion and promote natural beach recovery after storm events. There is space to accommodate this and keep some of the existing lawn reserve for community recreational use. Any revegetation and beach scraping/ beach nourishment works undertaken at this site should focus on enhancing and continuing the works already completed by Council at this site in mid-late 2023. The ongoing long term viability and optimisation could be informed by the outcomes of Action CL.01. Furthermore, as part of this Action, Council is to employ the most up to date beach scraping methodology in line with continued learnings and process improvements.	CHR.25 CHR.26 CHR.27 CHR.28 CHR.29 CHR.30 SER.9.5 SER.9.6 SER.9.7	SCC	DPI-Fisheries Crown Lands DPE(E&H) NPWS	Medium (16)	Year 1 and ongoing	Works completed.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CL.03	Callala Bay	Sheaffe Street stormwater improvements	The drainage at the road head to be collected and discharged to the beach in a manner which minimises its erosive impact at the back beach embankment and the beach berm. A vegetated grass swale could be constructed in between the road head and the dune - in order to capture excess storm water, recharge the dune aquifer, and prevent road runoff from worsening beach erosion.	SER.9.5 SER.9.6 SER.9.7	SCC	N/A	Medium (12)	Within 4-7 years	Works completed.
CL.04A	Callala Bay	Sailing Club Coastal Protection Works - Stage 1: Design and Approvals	The Stage 2 risk assessment has indicated that the Sailing Club building is a high value public asset considered to be exposed to a high level of coastal erosion risk. The existing coastal protection works in front of the sailing club building are comprised of informal and ad hoc placement of rock bags. This informal structure should be replaced with a formal design of coastal protection works, including renewal/replacement of the existing timber Sailing Club launching ramp. An approximately 30m long, low crested revetment will be constructed to protect the building from undermining due to coastal erosion impacts under present day and future sea level rise. This scope of works is to include: • Undertake concept design and associated design investigations - such as foreshore survey, services location and geotechnical investigations to determine the subsurface conditions around the structure, and the presence of any underlying bedrock strata. • Prepare a detailed design for the coastal protection works – which also includes renewal/replacement of the existing timber Sailing Club launching ramp. • Undertake any required environmental assessments and approvals A reference design has been prepared using preliminary coastal engineering analyses and is provided below. These design parameters would be refined as part of the detailed design process. 	CHR.28	SCC	DPI-Fisheries Crown Lands DPE(E&H)	High (24)	Within 1-3 years	Investigations completed, and clear direction for remaining stages established.
CL.04B	Callala Bay	Sailing Club Coastal Protection Works - Stage 2: Implementation	The coastal protection works identified in Action CL.04A should proceed through to construction. This would also include obtaining any relevant approvals and environmental assessments required to undertake the works.	CHR.28	SCC	DPI-Fisheries Crown Lands DPE(E&H)	Medium (16)	Triggered by Action CL.04A	Works completed.
CL.05	Callala Bay	Upgrade Callala Bay car park and foreshore access facilities	The purpose of this action will be to upgrade the car park and foreshore access facilities - in order to provide increased amenity and to mitigate the erosive impacts of uncontrolled stormwater flows and unrestricted pedestrian and dinghy access to the foreshore. The works associated with this Action should include: • Car Park Works: Formalisation of stormwater runoff and overland flow drainage at the Callala Bay car park - to alleviate overland flow impacts on foreshore erosion • Dinghy Storage: Provide formal dinghy storage at the car park area, in order to prevent abandoned and uncontrolled dinghy storage impeding foreshore amenity and access • Formalise Access: Formalise pedestrian access to the foreshore in between the boat ramp and the sailing club, and replant native dune vegetation species across this foreshore area to promote foreshore resilience.	SER.9.5 SER.9.6 SER.9.7	SCC	DPI-Fisheries Crown Lands DPE(E&H)	Medium (14)	Within 4-7 years	Works completed.
CL.06	Callala Bay	Addition of signage advising of overflow boat and trailer parking	Provide signage indicating where overflow boat and trailer parking can be found at Marine Parade	SER.9.6	SCC	N/A	Low (5)	Opportunistic, within 8-10 Years	Works completed.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CL.07	Callala Bay	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.9.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
CB.01	Callala Beach	Adaptation pathway for Community Hall and tennis club facilities	At end of building asset life or in the event of significant storm damage, undertake planning investigations to relocate the facilities away from the coastal hazard zone to a less exposed location.	CHR.34	SCC	N/A	Low (7)	Opportunistic, within 8-10 Years	Investigation works completed.
CB.02	Callala Beach	Empower local residents to engage in best practice foreshore management	This action involves working with local foreshore residents along Callala Beach in order to increase the resilience of the local dune system. This includes: • Providing local residents with information regarding best practice for management of the foreshore within their property boundaries - including appropriate foredune species to plant within their property boundary • Interested residents to be provided the opportunity to obtain access to Councils nursery	CHR.31	SCC	N/A	High (24)	Year 1 and ongoing	Increased awareness of coastal management issues amongst locals. Take up of nursery access program (and/or increase in dunecare involvement in this area), and considered to be of benefit to both council and the community.
CB.03	Callala Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.35 SER.10.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
HU.01	Huskisson	Upgrade the Huskisson Sea Pool, as per the 2022 Detailed Design Report (Consult Marine, 2022)	Construction of the sea pool at Huskisson was completed in 1965, making it over 50 years old. An investigation commissioned by Council (Consult Marine, 2022) has indicated that a fifty-year service life is all that can be expected for a structure of this type and era. Its design working life has now been exceeded and the pool has entered an end-of-life phase where an increased burden on maintenance and repairs will be realised, until a major refurbishment or renewal is undertaken. Two remedial options have been proposed - Option 1 entails minor works and Option 2 entails major refurbishment. An engineers report issued by Council in 2022, it recommended that Option 1 is undertaken initially, then Option 2 rolled-out if a funding source from Federal or State government can be secured.	CHR.40	SCC	N/A	High (30)	Within 1-3 years	Funding source secured, then works completed.
HU.02	Huskisson	Maintenance of the coastal protection works for the Huskisson Sea Pool	Undertake maintenance and make-safe works for the rock armour coastal protection works currently protecting the south-eastern flank of the Huskisson Sea Pool. This should include upgrading the access stairs that traverse the seawall and provide access to the foreshore.	CHR.40	SCC	N/A	Medium (20)	Triggered by completion of HU.01 - otherwise within 4-7 years	Works completed.
HU.03	Huskisson	Foreshore management works at Moona Moona Creek Entrance	Undertake foreshore management works at the northern side of Moona Moona Creek entrance. This should include implementation of a swale running behind the foreshore to prevent overland flow exacerbating the current erosion issues. This can be combined with landscaping and construction of an improved beach access track.	CHR.41	SCC	N/A	Medium (16)	Within 4-7 years	Works completed.
HU.04	Huskisson	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.41 SER.11.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
CW.01	Collingwood Beach	Stormwater Management Plan for Collingwood Beach	Design and implement a holistic stormwater management plan for Collingwood Beach. This should look at the volumes and discharges of the numerous stormwater outlets that discharge onto the beach, and the potential to optimise the network from both a functional perspective (and potentially consolidate/reduce the number of outlets), and minimising impacts of beach erosion in front of the outlets. This should also look at the potential for the implementation of utilised hind dune swales for stormwater retention and aquifer recharge.	CHR.37 CHR.38 CHR.39 CHR.40 CHR.41 CHR.42	SCC	N/A	Medium (12)	Within 4-7 years	Plan completed, and clear direction for management of stormwater on Collingwood beach established.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CW.02	Collingwood Beach	Stormwater outlet upgrade at Church St	The stormwater outlet at Church street is in need of an upgrade, as it appears to be experiencing undermining from wave run-up and beach erosion, and meandering of stormwater discharges causes erosion and results in loss of beach width. Upgrades should include the engineering design and approvals for the installation of a new headwall and scour protection to prevent future undermining of the outlet.	CHR.37 CHR.38 CHR.39 CHR.40 CHR.41 CHR.42	SCC	N/A	Medium (10)	Within 4-7 years	Works completed.
CW.03	Collingwood Beach	Stormwater outlet upgrade at Bayswater Rd	The stormwater outlet at Bayswater street is in need of an upgrade. The initial concept for the upgrade, prepared by Council, comprises a reinforced concrete stormwater pipeline that will discharge into a rip-rap drainage trench located in a swale behind the local foredune. The design also includes the construction of a proposed timber boardwalk above the outlet, that will provide a viewing platform and a seating area – in order to enhance local recreational amenity. This action will involve the implementation and construction of the preferred design solution for this stormwater outlet.	CHR.37 CHR.38 CHR.39 CHR.40 CHR.41 CHR.42	SCC	N/A	Medium (10)	Within 4-7 years	Works completed.
CW.04	Collingwood Beach	Adaptation / protection of Wastewater Assets	Investigate future adaptation of wastewater infrastructure along the beach front reserve at Collingwood Beach. This includes the potential protection or relocation of the sewage pump station at Church Street (AssetID: 41056824), and a 150 mm gravity main and 225 mm rising main along the southern end of Elizabeth Drive	CHR.38	SCC	N/A	High (24)	Within 1-3 years	Investigation undertaken, and clear direction for future adaptation of the assets is established.
CW.05	Collingwood Beach	Adaptation / protection of Wastewater Assets	Investigate future adaptation of wastewater infrastructure along the beach front reserve at Collingwood Beach. This includes the potential protection or relocation of 450 mm gravity mains along the seawards end of Susan Street and Montague Street, and a 450 mm rising main along the seawards side of residential lots along Elizabeth Drive (in between Susan Street and Montague Street).	CHR.38	SCC	N/A	High (24)	Within 1-3 years	Investigation undertaken, and clear direction for future adaptation of the assets is established.
CW.06	Collingwood Beach	Continue Collingwood Beach dune regeneration works	Continue the ongoing implementation of ecological restoration works within coastal reserves at Collingwood Beach with reference to the objectives of the associated coastal management areas. Prioritisation will be given to areas that comprise areas of Coastal Wetland and Littoral Rainforest and/or house threatened ecological communities (TECs), and targeted weed species control works. This should include: • Dune restoration and revegetation that removes weeds and plants more appropriate dune species in order to provide greater foreshore stability and promote natural recovery after storms. • Vegetation management and cases of environmental vandalism to be managed in accordance with Council's Tree Management Policy (Public Land), Vegetation Vandalism Prevention Policy, Foreshore Reserves Policy, and the NSW Dune Management Manual.	CHR.37 CHR.38 CHR.39 CHR.40 CHR.41 CHR.42 SER.11.3	SCC	N/A	High (27)	Within 1-3 years and ongoing	Plan implemented and works undertaken.
CW.07	Collingwood Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.41 SER.11.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
VN.01	Vincentia	Undertake dune restoration at Nelsons Beach	At Nelson Beach, strategically increase the vegetated dune buffer at pinch points along Plantation Point Parade in order to maintain a minimum 20 m vegetated buffer. This action involves minor realignment of the coastal walking path and some unsealed parking facilities to a slightly more landwards position.	CHR.42	SCC	N/A	Medium (10)	Within 4-7 years	Works completed. Increased cover of dune vegetation.
VN.02	Vincentia	Vegetation planting on Vincent Street to help improve foreshore slope stability	Replanting of deep-rooted native trees and shrubs in coastal slopes where trees have been removed in the vicinity of the boat ramp on Vincent Street.	CHR.42	SCC	N/A	Low (4)	Opportunistic, within 8-10 Years	Works completed. Increased cover of native vegetation.
VN.03	Vincentia	Provide dinghy storage	At Barfluer Beach, near the Vincentia Sailing Club shed, provide stacked boat storage in order to help reduce informal storage of boats on dunes and foreshore of the beach. The purpose of this is to reduce the impact of informal boat storage on the dune system and increase the health and resilience of the foreshore. This action includes assessing available landside locations for storage in the immediate vicinity of the existing Sailing Club shed and choosing the location with the least impact to the foreshore.	CHR.41	SCC	N/A	Low (5)	Opportunistic, within 8-10 Years	Works completed. Additional storage provided.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
HY.01	Hyams Beach	Little Hyams Beach dune management	Undertake a program of dune restoration at Little Hyams Beach - to provide additional erosion buffer for the access road, boat ramp, and public toilets. This should include: • Beach scraping in order to provide a greater sand buffer in the upper beach face. • Dune restoration and revegetation that replaces existing vegetation with more appropriate dune vegetation to provide greater foreshore stability and promote natural recovery after storms. This should also include dune building and restoration of the foreshore to the south of the Cyrus Street stormwater outlet, to mitigate the impacts of discharges meandering across the beach and generating erosion in front of properties.	As above.	SCC	N/A	Medium (12)	Within 4-7 years	Program implemented and works undertaken.

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Figure 4-19 LAP Action locations for Callala Bay



Figure 4-20 LAP Action locations for Huskisson (left) and Callala Beach (right)

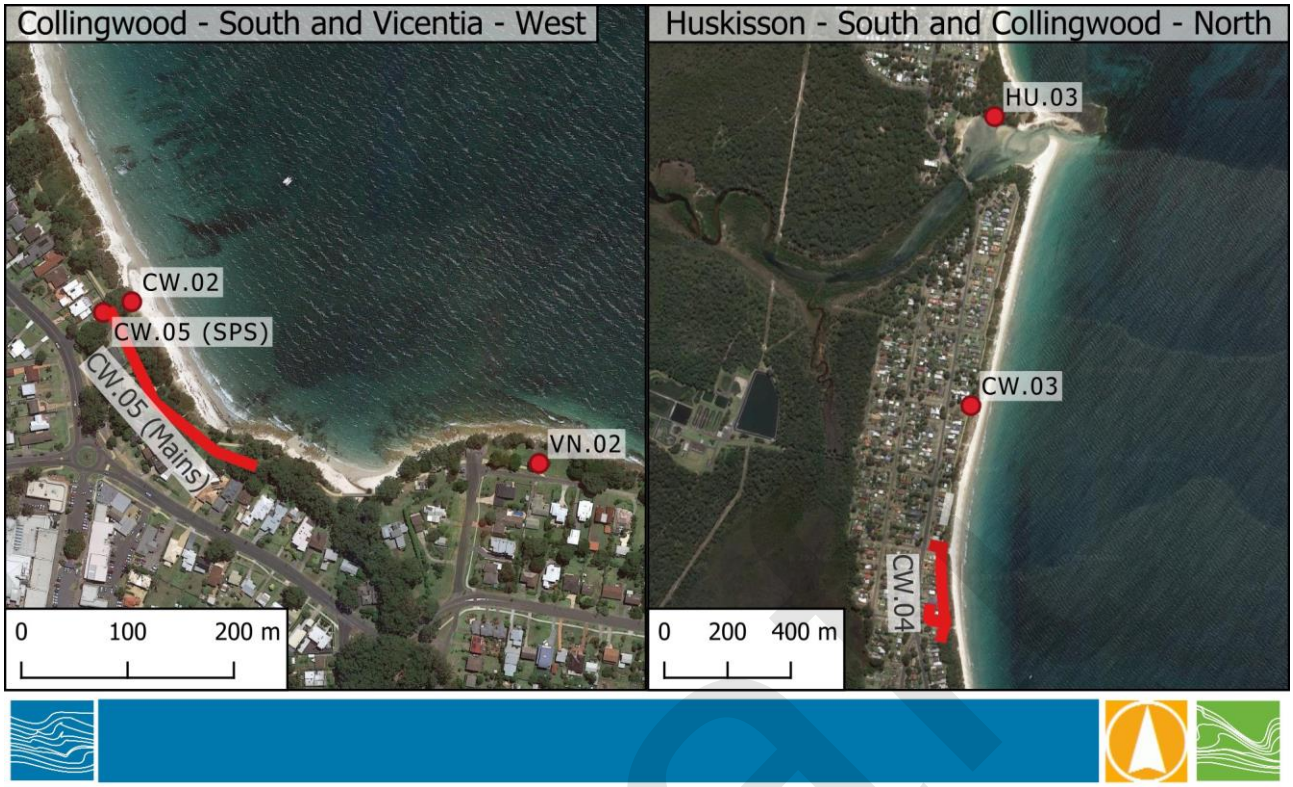

Figure 4-21 LAP Action locations for Collingwood Beach and Vincentia



Figure 4-22 LAP Action locations for Hyams Beach (left) and Vincentia (right)

4.6 Local Area Plan: Central LGA

Overview	
Area Coverage	The LAP for the Central zone of the Shoalhaven LGA covers the area of coastline from Cudmirrah Beach in the north to Warden Head in the south, including the following beaches and their adjoining headlands: ■ Cudmirrah Beach ■ Berrara Beach ■ Monument Beach ■ Flat Rock Beach ■ Washerwomans Beach ■ Bendalong Boat Harbour Beach ■ Inyadda Beach ■ Manyana Beach ■ Conjola Beach ■ Narrawallee Beach ■ Mollymook Beach ■ Golf Course Reef Beach ■ Collers Beach ■ Ulladulla Harbour Beaches (north, central, and south) The beaches are generally high energy, south-east facing beaches that are bordered and separated by protruding rocky headlands and steep coastal bluffs. Notable headland features include Red Head, Inyadda Point, Bannisters Point, Ulladulla Head and Wardens Head.
Key Environmental Features	The coastline in the LAP is intersected by the major estuaries of Sussex Inlet, Swan Lake, Lake Conjola, and Narrawallee Creek – as well as a series of small creeks and drainage outlets including Blackwater Creek, and Millards Creek. Much of the coastline in between Cudmirrah and Narrawallee Beach is comprised of Conjola National Park.
Local Population Centres	■ Cudmirrah ■ Berrara ■ Bendalong Point ■ Manyana ■ Cunjurong Point ■ Narrawallee ■ Mollymook ■ Ulladulla
Mapping References	■ An overview of this area is provided in Appendix A. ■ Mapping provided in Figure 4-29 to Figure 4-32 indicates the location of those actions that apply to a singular, discrete location. ■ Actions that are generic in nature or apply to an area more broadly have not been mapped. ■ Actions that related to repair, upgrade or closure of beach access tracks are mapped in Appendix E. The works identified for the beach access tracks represent an assessment based on present day conditions. The works and beach access tracks requiring works may be subject to change and Council will continue to reassess track condition into the future to scope, plan and prioritise the required works.
LAP	■ There are 29 Actions in the Central LGA LAP ■ These actions are detailed in Table 4-7.

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Quick Reference Image Gallery



Figure 4-23 Manyana Beach in 2021



Figure 4-24 Bendalong Harbour in 2023. Source: CoastSnap



Figure 4-25 Narrawallee Beach in 2023. Source: CoastSnap



Figure 4-26 Mollymook Beach in 2023. Source: CoastSnap



Figure 4-27 Collers Beach in 2021



Figure 4-28 Ulladulla Harbour in 2021

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Table 4-7 Central LGA LAP

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CD.01	Cudmirrah Beach	Investigate land use planning options to provide enhanced protection to the local dune system	Investigate land use planning options for improved coastal and environmental management - including potential rezoning Lot 7008 DP 1029732 from a RE1 (Public Recreation) to a C2 (Environmental Conservation), in order to provide enhanced protection to the local dune system. Note that this may require engagement with the Sussex Inlet SLSC	Opportunity for improved environmental management	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Investigation undertaken, and recommendations implemented.
BR.01	Berrara	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.14.1 SER.14.2 SER.14.3	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
BN.01	Bendalong	Foreshore restoration works at the Bendalong foreshore	Continue program of foreshore restoration works along the Bendalong Boat Harbour Beach foreshore in consideration of best practice coastal management. The works are to include enhancement of the local dune system through revegetation of foreshore area with appropriate coastal dune species (instead of turf/lawn), and formalisation of pedestrian beach access tracks to promote dune resilience.	SER.13.1 SER.13.3 CHR.46 CHR.47 CHR.48 SER.13.6 SER.13.7 SER.13.8	SCC	N/A	High (24)	Within 1-3 years	Works completed. Increased cover of dune vegetation, and formalised access installed.
BN.02	Bendalong	Washerwomans Beach dune restoration	Undertake dune restoration and revegetation across the 100 m long stretch of beach in front of the Washerwomans Beach car park, public toilets and picnic bench. The purpose of this is to enhance resilience by providing a more stable and highly vegetated dune system.	SER.13.4	SCC	N/A	Medium (12)	Within 4-7 years	Program implemented and works undertaken.
BN.03	Bendalong	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.47 SER.13.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
BN.04	Bendalong	Investigate the most appropriate way to direct stormwater from Holly Street	Investigate the most appropriate way to direct stormwater from Holly Street to the base of the coastal slope with appropriate erosion control measures below discharge points	CHR.48 SER.13.2	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Investigation undertaken, and clear direction provided for management of stormwater at Holly St
BN.05	Bendalong	Upgrade of local stormwater outlet, including appropriately engineered scour protection	These works will include the upgrade of local stormwater outlet, including appropriately engineered scour protection. The works will comprise: • Demolition of the existing 450mm diameter stormwater pipe and associated headwall. • Installation of a new 600 mm diameter stormwater pipe and associated headwall. • Installation of scour protection and outlet stabilisation structure - comprised of a composite of geotextile sand containers and rock bags.	SER.13.1 SER.13.3 CHR.46 CHR.47 CHR.48 SER.13.6 SER.13.7 SER.13.8	SCC	N/A	High (24)	Within 1-3 years	Works completed. Assets maintain appropriate engineering and safety standards.
IN.01	Inyadda Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.14.3	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
MN.01	Manyana Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.14.3	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
CJ.01	Cunjurong Point	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.14.3	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CJ.02	Conjola Area	Opportunistic nourishment of beaches adjacent to Conjola	Opportunistic nourishment of beaches adjacent to Conjola within the same tertiary sediment compartment utilising sand that may become periodically available as the result of the implementation of the Lake Conjola Entrance Management Policy.	SER.14.1 SER.14.3	SCC	N/A	Low (7)	Year 1 and ongoing	Nourishment works undertaken, and post works monitoring conclude that nourishment campaign achieved its design objectives.
NA.01	Narrawallee Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.53 SER.15.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
NA.02	Narrawallee Beach	Dune maintenance	Continue to monitor and maintain the vegetated dune at the southern end of the beach in order to protect wastewater assets from erosion and inundation.	CHR.50	SCC	N/A	Medium (9)	Year 1 and ongoing	Wastewater assets behind the dune maintain appropriate engineering and safety standards.
ML.01	Mollymook Beach	Stormwater outfall works and dune restoration	At the stormwater outlet opposite 31 Mitchell Parade, undertake local erosion mitigation works to alleviate the erosion pinch point that is placing the stormwater infrastructure and Mitchell Parade at risk from coastal hazards. The works should be similar in nature to the works undertaken opposite 57 Mitchell Parade, around 250 m to the north. The works will include a combination of: • Stormwater scour protection works, to prevent the meandering stormwater flows from exacerbating beach erosion • Dune restoration works either side (North and South) of the scour protection works, to increase the volume of vegetated dune and improve coastal resilience.	CHR.59 CHR.60 SER.16.7	SCC	N/A	High (24)	Within 1-3 years	Works completed.
ML.02	Mollymook Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.59 SER.16.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
ML.03	Mollymook Beach	South Mollymook Coastal Protection Works	The implementation of the South Mollymook Coastal Protection Works should proceed through to construction phase, in accordance with the design and approvals process (currently nearing finalisation). Council is currently in discussion with the Golf Club to co-fund a proportion of the works, and final commitments are yet to be determined. This CMP will be considered the primary development consent mechanism for these coastal protection works in accordance with Section 2.16(2)(a) of the RH SEPP.	CHR.56 CHR.57 CHR.58 CHR.59 CHR.60	SCC	DPE(E&H)	High (30)	Within 1-3 years	Works completed.
ML.04	Mollymook Beach	Landslide area rehabilitation at Mitchell Parade	The findings of the investigation Mitchell Parade Geotechnical report (Cardno, 2022) should be reviewed and implemented in order to mitigate the risk of future landslides in this area. Given the location and nature of the cliff area, the investigation recommends either a Mechanically Stabilised Earth (MSE) wall or rock fill stabilisation as the preferred option.	CHR.55 CHR.60	SCC	N/A	High (24)	Within 1-3 years	Works completed.
ML.05	Mollymook Beach	Landslide risk management (LRM) recommendations for lookout at Bannisters Point	Review and implement the findings of the geotechnical assessment undertaken for the lookout at Bannisters Point to mitigate the risk of future landslides in this area (JK Geotechnics, 2019). This will address the potential cliff and slope instability, and to provide landslide risk management (LRM).	CHR.55 CHR.60	SCC	N/A	High (24)	Within 1-3 years	Works completed.
ML.06	Mollymook Beach	Dune restoration and access management at South Mollymook	Undertake a program of dune restoration along the 250 m long stretch of foreshore in between Blackwater Creek and the Surf Club. This should include: • Dune restoration and revegetation that removes weeds and plants more appropriate dune species in order to provide greater foreshore stability and promote natural recovery after storms. • Revegetation activities must consider a planting palate that is composed of species from Bangalay Sand Forest (Ecoplanning, 2023) to extend and enhance the TEC. • Implementation of dune fencing and construction of pedestrian access tracks for formalise access.	SER.16.5 SER.16.8	SCC	N/A	Medium (8)	Within 4-7 years	Works completed. Increased cover of dune vegetation, and formalised access installed.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
ML.07	Mollymook Beach	Sand Scraping and dune restoration at North Mollymook	At the northern end of Mollymook Beach (north of Mollymoke Farm Creek), undertake a program of dune restoration in order to increase the beach width and the width of the vegetated dune system (extending it seawards by around 10 m) in order to provide increased protection to Beach Road and associated facilities. This should include: • A program of sand scraping to increase the volume of sand on the upper beach face and increase beach width. • Dune restoration and revegetation that removes weeds and plants more appropriate dune species in order to provide greater foreshore stability and promote natural beach recovery after storms.	SER.16.5	SCC	N/A	Medium (16)	Within 4-7 years	Works completed. Increased cover of dune vegetation, and formalised access installed.
CO.01	Golf Course Reef Beach	Upgrade Golf Course Reef Beach car park and foreshore access facilities	The purpose of this Action will be to upgrade the car park and foreshore access facilities - in order to provide increased amenity and to mitigate the erosive impacts of uncontrolled stormwater flows and unrestricted pedestrian and dinghy access to the foreshore. The works associated with this action should include: • Formalisation of stormwater runoff, and upgrade of the car park facilities. • Formalisation of pedestrian access to the beach • Revegetation of the foreshore with native species As part of this action, Council should engage with Ulladulla LALC and other relevant local Traditional Owner groups to determine the best way to provide protection for culturally sensitive areas at Golf Course Reef Beach foreshore and carpark.	SER.17.2 SER.17.3 SER.17.4 SER.17.5	SCC	Ulladulla LALC	Medium (16)	Within 4-7 years	Works completed. Improved management of stormwater. Access formalised. Increase cover of native dune vegetation. ACH values protected.
CO.02	Collers Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	CHR.65 SER.17.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
CO.03	Collers Beach	Dune restoration and carpark upgrade at Collers Beach	This action involves undertaking a program of dune restoration in front of car park and sewage pump station, in order to improve recreational/visual amenity, increased protection for the foreshore and minimise erosion from uncontrolled pedestrian access. This would include: • Dune restoration and revegetation that removes weeds and plants more appropriate dune species in order to provide greater foreshore stability and promote natural recovery after storms. • Increase width of dune vegetation another 5 m landward within Council foreshore reserve, reducing footprint of unsealed car park by 5 m west/ landwards. • Providing a sealed car park for safer vehicle access • Installing a formal pedestrian access point from the car park to the beach	CHR.62 CHR.63 CHR.64 CHR.65 CHR.66	SCC	N/A	Medium (8)	Within 4-7 years	Works completed.
UL.01	Ulladulla Harbour	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.18.7	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
UL.02A	Ulladulla Harbour	Princes Highway Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	A formal coastal engineering condition assessment should be undertaken of the existing coastal protection works in front of the Princes Highway, in order to determine its ability to adequately protect the public highway (both now and into the future). The outcome of this assessment should be a clear understanding of the nature and extent of maintenance works required to maintain the intended level of protection and function over future timeframes.	CHR.72 SER.18.1	SCC	TfNSW	High (30)	Within 1-3 years	Inspection undertaken, and clear direction of required works is provided.
UL.02B	Ulladulla Harbour	Princes Highway Coastal Protection Works - Stage 2: Maintenance works	Based on the information provided in the condition assessment (Action UL.02A), undertake the required maintenance and make-safe works for the existing coastal protection works - in order to provide ongoing protection for the Princes Highway.	As above.	SCC	TfNSW	Medium (20)	Triggered by Action US.02A	Works completed.
UL.03	Ulladulla Harbour	Foreshore restoration works at Central Harbour Beach	In between car park and seawall, undertake dune vegetation restoration works (to replace current lawn along the foreshore), and install formal foreshore access points.	SER.18.5	SCC	N/A	Low (3)	Opportunistic, within 8-10 Years	Works completed. Increased native dune vegetation cover.
UL.04	Ulladulla Harbour	Install dinghy racks	Determine appropriate location for and install dinghy racks by the car park.	SER.18.5	SCC	N/A	Low (5)	Opportunistic, within 8-10 Years	Works completed. Increased dinghy storage provided.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
UL.05	Ulladulla Harbour	Erosion monitoring at South Ulladulla Harbour Beach	Monitor South Ulladulla Harbour Beach for erosion impacts resulting from vertical shotcrete seawall	CHR.71	SCC	N/A	Low (3)	Year 1 and ongoing	Monitoring provides data that is considered by Council to be of tangible benefit for coastal management purposes.

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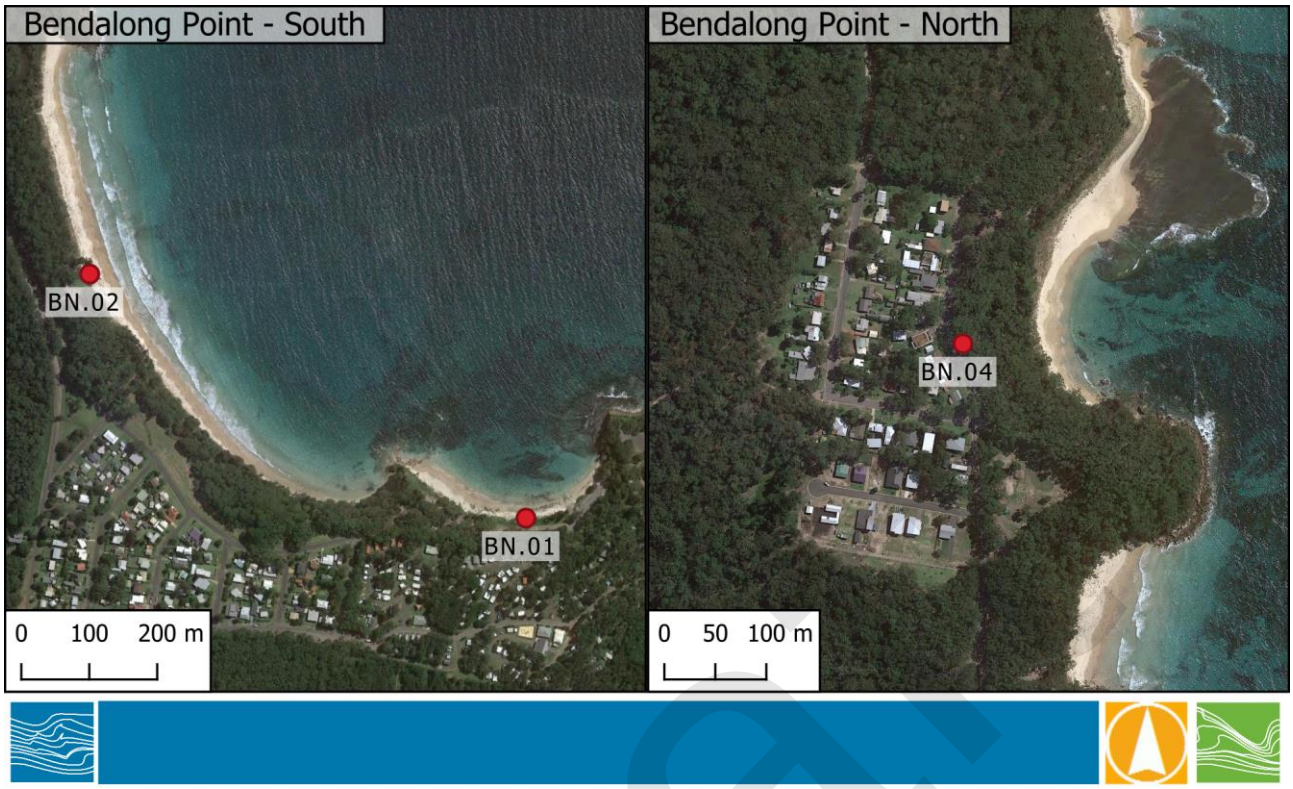

Figure 4-29 LAP Action locations for Bendalong South (left) and North (right)

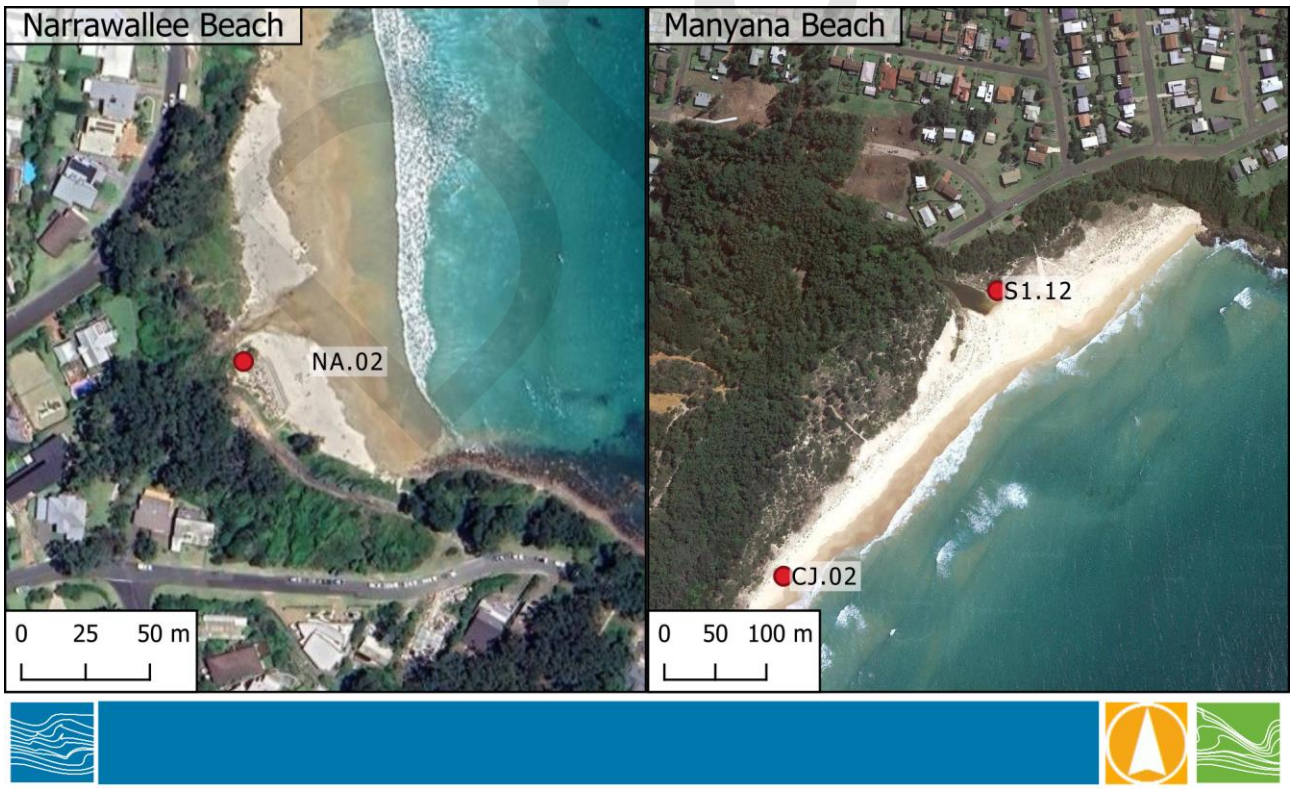

Figure 4-30 LAP Action locations for Narrawallee Beach (left) and Manyana (right)



Figure 4-31 LAP Action locations for Mollymook Beach



Figure 4-32 LAP Action locations for Ulladulla Harbour (left) and Collers Beach (right)

4.7 Local Area Plan: Southern LGA

Overview	
Area Coverage	The LAP for the Southern zone of the Shoalhaven LGA covers the area of coastline from Rennies Beach in the north to North Durras Beach in the south, includes the following beaches: ■ Rennies Beach ■ Racecourse Beach ■ Burrill Beach ■ Wairo Beach ■ Bawley Beach ■ Cormorant Beach ■ Gannet Beach ■ Kioloa Beach ■ Merry Beach ■ Depot Beach ■ North Durras Beach These areas include a collection of longer, more exposed beaches in the north, that transitions into a series of smaller pocket beaches in the south that are punctuated by discrete headland features and coastal bluffs. Notable headlands include Dolphin Point, Bawley Point, Murramarang Point, O'Hara Head and Snapper Point.
Key Environmental Features	The coastline in the LAP is intersected by the estuaries of Burrill Lake, Lake Tabourie, Meroo Lake, Willinga Lake, Termeil Creek, and Cormorant Lagoon. Much of the coastline in this area is comprised of undeveloped coastal reserve, including NPWS managed coastline of Meroo National Park, and Murramarang National Park. The 5 km stretch of coastline between Gannet Beach and Bull Pup Point contains the Murramarang Aboriginal Area, which is located on NPWS land tenure. The Murramarang Aboriginal Area includes 3 beaches – Murramarang Beach, Cat and Kitten Beach, Bull Pup Beach The Batemans Bay Marine Park extends across the coastal waters of the area, and commences at the southern headland of Gannet Beach.
Local Population Centres	■ Dolphin Point ■ Lake Tabourie ■ Bawley Point ■ Kioloa ■ Depot Beach ■ Durras North
Mapping References	■ An overview of this area is provided in Appendix A ■ Mapping provided in Figure 4-39 to Figure 4-41 indicates the location of those actions that apply to a singular, discrete location. ■ Actions that are generic in nature or apply to an area more broadly have not been mapped. ■ Actions that related to repair, upgrade or closure of beach access tracks are mapped in Appendix E. The works identified for the beach access tracks represent an assessment based on present day conditions. The works and beach access tracks requiring works may be subject to change and Council will continue to reassess track condition into the future to scope, plan and prioritise the required works.
LAP	■ There are 18 Actions in the Southern LGA LAP ■ These actions are detailed in Table 4-8.

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Quick Reference Image Gallery



Figure 4-33 Rennies Beach in 2023. Source: CoastSnap



Figure 4-34 Racecourse Beach in 2023. Source: CoastSnap



Figure 4-35 Wairo Beach in 2018. Source: SCC



Figure 4-36 Cormorant Beach in 2021



Figure 4-37 Kioloa Beach in 2021



Figure 4-38 Depot Beach in 2021

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Table 4-8 Southern LGA LAP

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
RN.01	Rennies Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.19.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
RA.01	Racecourse Beach	Investigate land use planning options to provide enhanced protection to the local dune system	Investigate land use planning options for improved coastal and environmental management - including potential rezoning Lot 2 DP 1265528 and Lot 7041 DP 1059893 from a RE1 (Public Recreation) to a C2 (Environmental Conservation), in order to provide enhanced protection to the local dune system.	Opportunity for improved environmental management	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Investigation undertaken, and recommendations implemented.
BU.01	Burrill Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.19.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
BU.02	Burrill Beach	Investigate land use planning options to provide enhanced protection to the local dune system	Investigate land use planning options for improved coastal and environmental management - including potential rezoning Lot 7002 DP 1050294 from a RE1 (Public Recreation) to a C2 (Environmental Conservation), in order to provide enhanced protection to the local dune system.	Opportunity for improved environmental management	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Investigation undertaken, and recommendations implemented.
WR.01	Wairo Beach	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.19.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
WR.02	Wairo Beach	Investigate land use planning options to provide enhanced protection to the local dune system	Investigate land use planning options for improved coastal and environmental management - including potential rezoning Lot 2 DP 1134134 from a RE1 (Public Recreation) to a C2 (Environmental Conservation), in order to provide enhanced protection to the local dune system.	Opportunity for improved environmental management	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Investigation undertaken, and recommendations implemented.
WR.03	Lake Tabourie	Maintain, repair, upgrade, and rationalise beach access tracks	Maintain, repair, upgrade, and rationalise beach access tracks at this location, as detailed in the findings of the Shoalhaven Beaches Asset Management Strategy (Advisian, 2021), and based on contemporary monitoring and inspections by Council (2023).	SER.19.1	SCC	N/A	Low (7)	Year 1 and ongoing	Assets maintain appropriate engineering and safety standards. Works reflect best practice dune management.
BW.01	Bawley Beach	Dune building and restoration	Provide increased protection for the Bawley Beach car park and boat ramp by undertaking a localised dune building and restoration program across the 35 m stretch of foreshore in front of the car park. This could include scraping sand from lower on the beach profile (from the salient behind the local nearshore reef) to create a wider and more densely vegetated dune system. Dune revegetation works should focus on removal of weeds and replanting of native primary and secondary dune vegetation.	CHR.71 CHR.72	SCC	N/A	Medium (10)	Within 4-7 years	Works completed. Increased native dune vegetation cover.
BW.02	Bawley Point Headland	Upgrade and formalise parking facilities and pedestrian access to the Bawley Point Headland and the Gantry	Upgrade the existing parking and access facilities in order to provide safer access and increased capacity. These works should also include adequate vehicle restrictions (through fencing and sandstone blockwork) to prevent unauthorised vehicle access beyond the parking section.	SER.20.2 SER.20.3	SCC	N/A	Medium (21)	Within 4-7 years	Works completed.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
CM.01	Cormorant Beach	Develop an entrance management policy for the Cormorant Beach Lagoon	This action involves the preparation of a Council policy for the opening of the estuary. It would involve an investigation into whether there is a substantial need to artificially open the estuary entrance for flood mitigation purposes, particularly for the surrounding properties along Terragong Ave, Lurnea Ave, Murramarang Rd, and Tingira Dr. Council is currently preparing the Willinga Lake Flood Study which includes the Bawley Point catchments, and this action would be triggered following its completion. It should be noted that the NSW State Government supports minimal interference with estuary entrance barriers and advocates natural processes being allowed to operate to the greatest extent possible. It does not support the artificial opening of an estuary unless it can be demonstrated that the social, environmental and economic benefits greatly outweigh any potential adverse environmental impacts to the Cormorant Beach Wetlands (which are mapped as state significant coastal wetlands under the Resilience and Hazards State Environmental Planning Policy).	CHR.67	SCC	N/A	Medium (14)	Completion of Willinga Lake Flood Study	Policy developed and implemented.
CM.02	Cormorant Beach	Install a water level gauge in the Cormorant Beach Lagoon	This will involve installation of a water level gauge within the lagoon/wetlands. The purpose of this will be to: • To improve management of flood risk for local residents by monitoring & publishing water levels in real time. • To provide a dataset to improve the understanding of physical processes working in the wetlands (including water levels, hydrodynamics and entrance opening / closing regime).	CHR.67	SCC	N/A	High (24)	Within 1-3 years	Gauge implemented and maintained, and data considered to be of tangible benefit for coastal management by Council.
CM.03	Cormorant Beach	Cormorant beach pedestrian access management	Provide stabilisation to the erosion pinch point between the estuary entrance and Tingara Drive by using fencing to direct all pedestrian access through the existing formal beach access track. The fenced off area should become a localised point of restoration, with additional revegetation work to provide stability - including the planting of deep rooted vegetation.	CHR.72	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Works completed. Access formalised. Increased native dune vegetation cover.
KI.01A	Kioloa Beach	Kioloa Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	A formal coastal engineering condition assessment should be undertaken of the existing coastal protection works that extend from in front of car park up around to the Marine Rescue building. This assessment should also include a geotechnical investigation in order to determine the subsurface conditions around the Marine Rescue building and its exposure to coastal erosion. The outcome of this assessment should be a clear understanding of the nature and extent of maintenance works required to maintain the intended level of protection and function over future timeframes.	CHR.70 CHR.71 CHR.72 SER.20.4 SER.20.5	SCC	N/A	High (24)	Within 1-3 years	Assessment completed, and clear direction for future management provided.
KI.01B	Kioloa Beach	Kioloa Coastal Protection Works - Stage 2: Maintenance works	Based on the information provided in the condition assessment (Action KI.01A), undertake the required maintenance and make-safe works for the existing coastal protection works - in order to provide ongoing protection for the access road, car park, and Marine Rescue building.	As above.	SCC	N/A	Medium (16)	Triggered by Action KI.01A	Works completed.
KI.02	Kioloa Beach	Stormwater formalisation along seaward end of Scerri Drive	Install kerb and guttering along seaward end of Scerri Drive to prevent overland flow from exacerbating local beach erosion and dune instability in front of the road. This Action could be included as part of any future coastal protection upgrade works.	SER.20.7	SCC	N/A	Medium (14)	Triggered by Action KI.01B	Works completed.
ME.01	Merry Beach	Formalise access and increase foreshore resilience	Use dune fencing to formalise access to the beach (at both the north and central access points) and provide protection for the local foredunes vegetation. This could be accompanied by strategic planting of native dune vegetation.	SER.20.8	SCC	N/A	Low (6)	Opportunistic, within 8-10 Years	Works completed. Access formalised. Increased native dune vegetation cover.
DP.01	Depot Beach	Long term adaptation pathway for the Depot Beach vehicle access track	Engage with the National Parks and Wildlife Service to discuss long term future management of the Depot Gutter Road vehicle access track. Options include realignment of the road to a more landwards location, and eventual abandonment of the road.	CHR.72	SCC	NPWS	Low (4)	Opportunistic, within 8-10 Years	Long term adaptation pathway established.
DP.02	Depot Beach	Dune building and restoration	Engage with the National Parks and Wildlife Service to discuss restoration of the foredune along the length of the Depot Gutter Road vehicle access track, in order to provide increased stability of the foreshore in the short term.	CHR.72	NPWS	SCC	Low (7)	Opportunistic, within 8-10 Years	Works completed. Access formalised. Increased native dune vegetation cover.

ID	Location	Action Name	Action Description	Risk Being Addressed	Lead Agency	Support Partners	Priority	Timing	Performance Measures
DU.01	North Durras Beach	Foreshore management works at the North Durras Creek entrance	Engage with the National Parks and Wildlife Service to undertake technical investigations to determine the optimised foreshore management works at the North Durras Creek Entrance. This could include assessment of: • Foreshore stabilisation works to protect the access road. Works would need to be confined to areas outside of the Habitat Protection Zone within Batemans Marine Park (that is, above the above Mean High Water level). • Formalisation of local stormwater to prevent overland flows exacerbating erosion of the foreshore. Once the potential works are identified - this action will be updated to include the implementation of the works. This will require the CMP to be amended and re-submitted for certification.	CHR.71 CHR.72	SCC	NPWS	Medium (14)	Within 4-7 years	Works completed.

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Figure 4-39 LAP Action locations for Bawley Point and Cormorant Beach



Figure 4-40 LAP Action locations for Merry Beach (left) and Kioloa Beach (right)

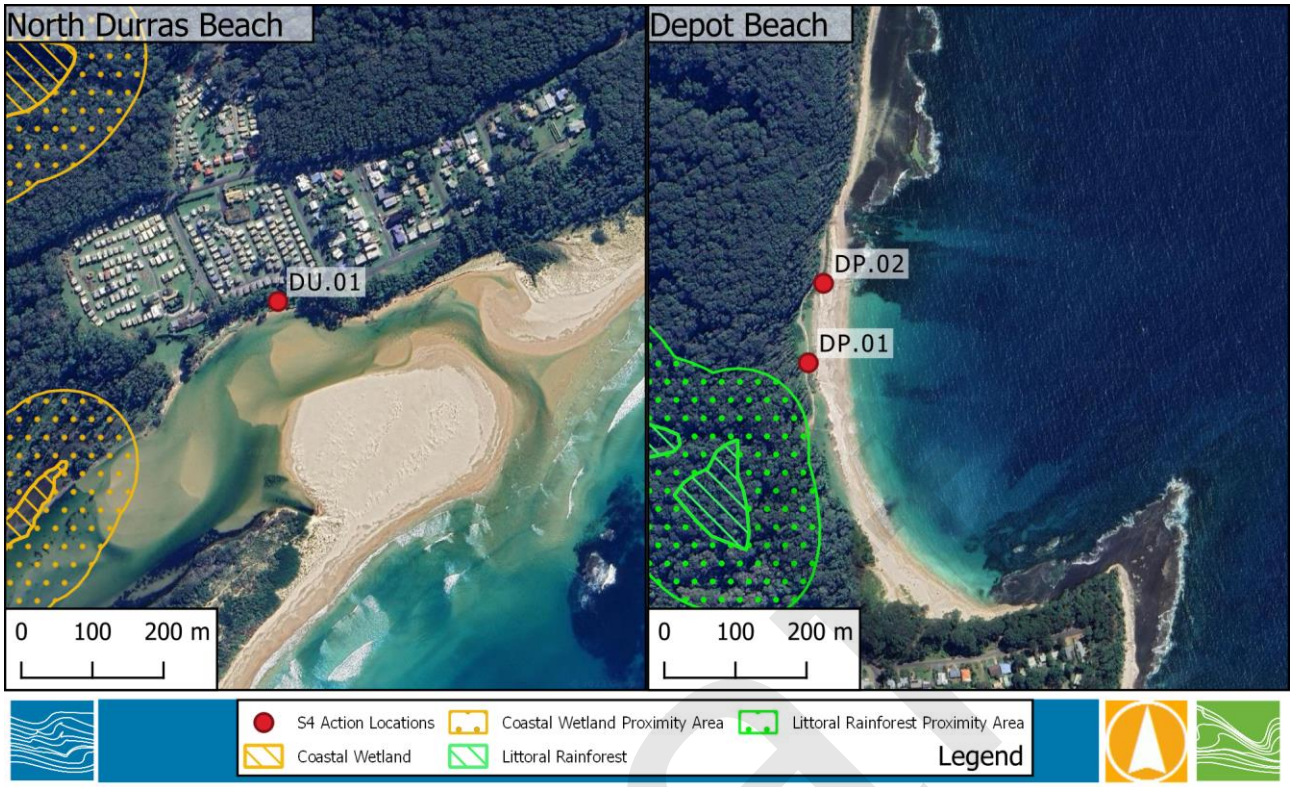

Figure 4-41 LAP Action locations for North Durras Beach (left) and Depot Beach (right)

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4.8 Actions to be Implemented by Public Authorities other than Council

ID	Location	Action Name	Action Description	Lead Agency	Support Partners	Timing	Performance Measures
DP.02	Depot Beach	Dune building and restoration	Engage with the National Parks and Wildlife Service to discuss restoration of the foredune along the length of the Depot Gutter Road vehicle access track, in order to provide increased stability of the foreshore in the short term.	NPWS	SCC	Opportunistic, within 8-10 Years	Works completed. Access formalised. Increased native dune vegetation cover.

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4.9 Implementation of CMP Actions

4.9.1 Actions to be Implemented by Council

Under Section 22 of the CM Act, CMP actions that are to be implemented by Council are to be given effect through the Integrated Planning and Reporting (IP&R) Framework, which is required to conform to the state-based Integrated Planning and Reporting (IP&R) structure mandated in the LG Act. This framework is depicted in Figure 4-42. Table 4-9 shows how the CMP process informs, and is informed by, the elements of the IP&R framework.

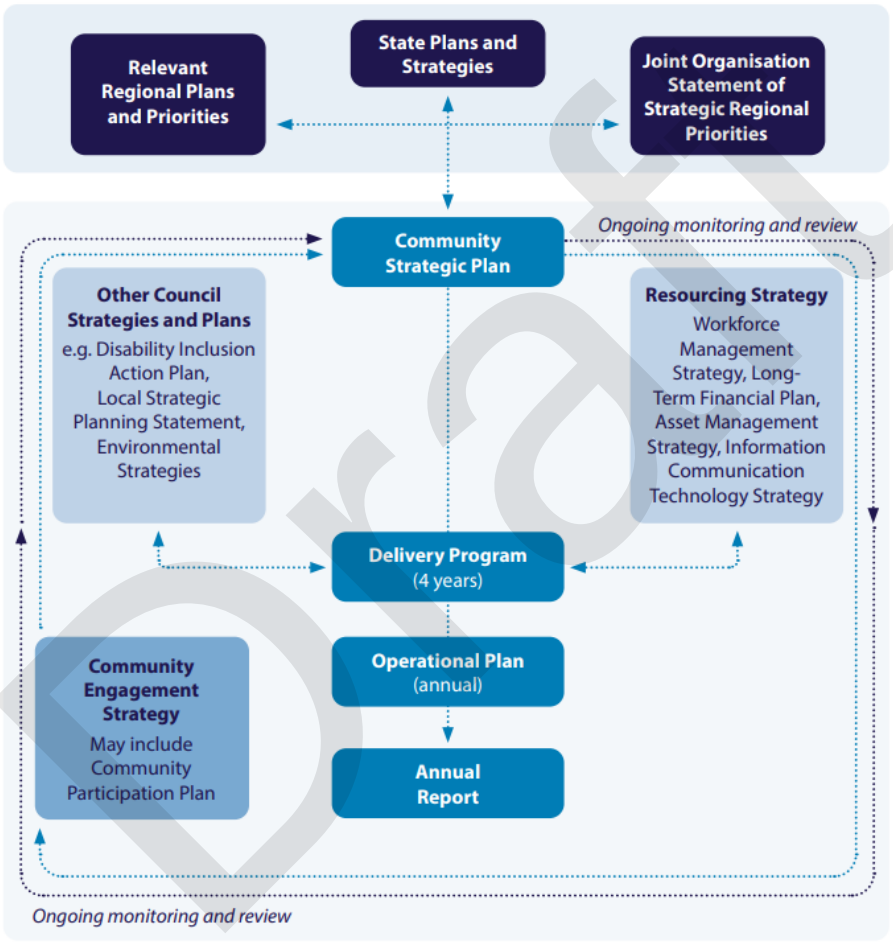

Figure 4-42 Integrated Planning and Reporting Framework (Source: SCC Delivery Program Operational Plan & Budget 2023/24)

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Table 4-9 Relationship between the IP&R Framework and the CMP

IP&R Component	Purpose	CMP Implementation & Linkage
Community Strategic Plan – Shoalhaven 2032 (CSP) *10+ years*	The CSP forms the overarching, visionary document that translates the community's key priorities and aspirations into long-term strategic goals that guide the future direction of the Shoalhaven LGA. The Plan represents the highest level of strategic planning undertaken by a local council.	The CMP must reflect and support implementation of the CSP. Under the CM Act, the objectives and management actions developed as part of CMPs are required to be strategically aligned with the objectives and strategies outlined in the CSP.
Delivery Program (DP) *4 years*	The Delivery Program Objectives are Council's response to the Community Strategic Plan and what Council can do within each term of the elected Council. It is a fixed 4 year program, which is a statement of commitment from each newly elected Council. It identifies all key activities a council has committed to undertake over its 4 year life cycle.	Forthcoming and ongoing CMP actions for the relevant 4-year period must be included in the associated delivery program.
Resourcing Strategy *4 years*	The Resourcing Strategy supports the delivery program and outlines the resources required to implement it. It is therefore a critical link when translating strategic objectives into actions. The Resourcing Strategy generally consists of 3 inter-related elements: Long-Term Financial Planning, Asset Management Planning and Workforce Planning.	Resourcing implications of the CMP should be reflected in the Resourcing Strategy and CMP actions relating to Council assets should be considered in the relevant Asset Management Plan.
Operational Plan *Annual*	The Operational Plan is generated over shorter, one-year planning timeframes and provides the detail of the Delivery Program, identifying the individual projects and activities that will be undertaken in a specific year to achieve the commitments of the program.	Forthcoming and ongoing CMP actions are scheduled into each years' operational plan.
Annual Report *Annual*	Council is required to deliver an Annual Report to document their progress in implementing the Delivery Program and Operational Plan activities over each financial year.	The annual report is a mechanism to report on the progress of each CMP actions listed in the Delivery Program and Operational Plan.

The business plan in Section 6 outlines how each of the management actions may be implemented within Council's IP&R framework. While some actions may be identified as a priority for implementation in the CMP, it is recognised that the Plan needs to retain sufficient flexibility such that Council (or other responsible agencies) may implement any of the management actions at any time on an opportunistic basis, regardless of their priority. Such an opportunity may arise where, for example, funding becomes available through a specific grant or funding program.

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4.9.2 Actions to be Implemented by Public Authorities other than Council

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

1) Public authorities (other than local councils) are to have regard to coastal management programs to the extent that those programs are relevant to the exercise of their functions.

2) In particular, those public authorities are to have regard to relevant coastal management programs and the coastal management manual in the preparation, development and review of, and the contents of, any plans of management that those public authorities are required to produce and, in doing so, are to have regard to the objects of the Act.

4.9.3 Implementation of feasibility investigations itemised in this CMP

There are a number of locations across the study area where coastal hazards were identified as being of high risk, but there was insufficient detailed local information available to assess the performance and impacts of potential management options with a high level of confidence. In these instances, the Actions in this CMP detail the need for localised studies of coastal processes and the subsequent investigations of potential management options, in order to provide greater clarity and certainty regarding future management pathways. These Actions are listed in Table 4-10. Once lead agencies and supporting partners agree on the preferred management actions, these actions will be updated to include the implementation of preferred options. This will require the CMP to be amended and re-submitted for certification.

Table 4-10 Actions pertaining to local studies and feasibility investigations

ID	Locality	Action Name	Lead	Supporting Partners
S1.12	Study Area Wide	Feasibility investigations, design, and approvals for addressing estuary entrance instability at Mollymook Beach, Manyana Beach, and Hyams Beach	SCC	DPE(E&H) DPI-Fisheries
CR.01	Currarong Beach	Shoreline erosion protection structure at Beecroft Parade - Undertake investigations, detailed design, and approvals	SCC	DPE(E&H)
CR.02	Currarong Beach	Investigate and finalise options to manage long term coastal hazard risk at Currarong Beach	SCC	DPI-Fisheries Crown Lands DPE(E&H)
CL.01	Callala Bay	Callala Bay Coastal Processes and Hazard Definition Study and Management Option Investigation	SCC	DPE(E&H) NPWS DPI-Fisheries
DU.01	North Durras Beach	Foreshore management works at the North Durras Creek entrance.	SCC	NPWS

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5 WHETHER THE CMP IDENTIFIES RECOMMENDED CHANGES TO THE RELEVANT PLANNING CONTROLS, INCLUDING ANY PROPOSED MAPS

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

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

- Beach erosion.
- Shoreline recession.
- Estuary entrance instability.
- Coastal cliff or slope instability.
- Coastal inundation.
- Tidal inundation.
- Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

This is detailed in Action S1.13.

Council have mapped beach erosion and shoreline recession for relevant beaches in the LGA (Advisian, 2016), and coastal cliff or slope instability as part of Stage 2 of the CMP (Douglas Partners, 2023) as part of this CMP, with the intent that this mapping will be used to prepare a CVA. Other CMPs for specific estuaries across the Shoalhaven LGA are also currently being prepared that are to include mapping of additional coastal hazards such as coastal and tidal inundation, which council will combine as part of a single planning proposal to prepare a CVA once they are also completed.

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 sea level rise on coastal hazards.

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6 BUSINESS PLAN

6.1 The Benefits of Implementing the CMP

The coastline comprises a major environmental, social, and economic asset for the Shoalhaven LGA and the south coast region. It is a significant contributor to the social and cultural wellbeing of the community, and also provides substantial economic value as a tourist drawcard. The coastal zone directly supports the Shoalhaven LGA visitor economy, which is estimated at $853 million per year and supports an estimated 5,000+ jobs across the region (Shoalhaven City Council, 2018).

There are a range of threats and stressors identified in this CMP that currently present a risk to the environmental, social, and economic values of the study area. Furthermore, the coastline 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 coastal, 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.

Investment in the CMP provides an opportunity to directly improve and preserve the natural hazards resilience, water quality, environmental habitats, cultural values, and recreational amenity of the coastline – and in doing so, bring significant public benefits.

The primary focus of this business plan is to mitigate coastal risks for the broader public's benefit while considering the diverse locations, environments, and threats within the Shoalhaven Open Coast and Jervis Bay. Consequently, the business plan does not allocate cost-sharing models to private beneficiaries, and there is no provision for implementing a coastal protection service charge.

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 is estimated to cost $45 Million (2023 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 (4-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 Shoalhaven City Council Delivery Program Operational Plan 2023/24, Council's annual revenue from ordinary rates and charges is around $270 million per year (Shoalhaven City Council, 2023c).

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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 6-1. The value of this funding cannot be accurately quantified until such time as it is awarded. It should be noted that this is not an exhaustive list of all funding opportunities, and that over the ten-year lifecycle of the CMP additional or new funding sources may become available.

Table 6-1 Summary of potential funding sources of the CMP

Funding Source	Details / Description
State Government	
NSW Coastal and Estuary Grants Program	The costs associated with delivery of the CMP can be partly funded by the NSW Coastal and Estuary Grants Program administered by DPE. The program supports coastal and estuary planning projects and the implementation of works identified in certified CMPs. Funding is available under 5 funding streams: ▪ A planning stream: for planning and studies including investigation, design and cost-benefit analyses for infrastructure works recommended in a certified CMP. ▪ Four implementation streams – one for each of the coastal management areas. The focus of these streams are projects that manage risks from coastal hazards, and improve the health of estuaries, wetlands and littoral rainforests across NSW. For projects that address a documented action in a certified CMP funding is $2 from the State Government for every $1 provided by Council. Certification of this CMP will facilitate eligibility for funding of many of the actions proposed in this CMP under the program. This grant funding program is contestable, prioritised to Council applications with certified CMPs and subject to State government funding priorities and allocations.
Marine Estate Management Strategy	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. The management of priority threats is grouped into 9 management initiatives that summarise the objectives, benefits, threats, stressors and proposed management actions. An implementation plan (developed by the Authority's member agencies in consultation with key stakeholders) articulates the management actions in more detail. CMPs are key delivery mechanisms for the MEMS.
NSW Disaster Risk Reduction stream grants	Under two funding pathways, Discovery and Scale, the State Risk Reduction stream aims to reduce or enable the reduction of state-level risks, risks of state significance and systemic risks potentially impacting NSW (NSW Government, 2023). The Discovery Projects pathway offers funding of up to $500,000, for projects that will test and pilot new approaches to achieve breakthrough disaster risk reduction outcomes. The projects must have potential for state-wide significance or impact. The Scale Projects pathway offers funding of up to $2.5 million, for projects that aim to generate a new product, technology, platform or approach that will have state-wide impact at a scale beyond piloting or testing.

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Funding Source	Details / Description
Saving our Species program	Administered by DPE, 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.
NSW Heritage Grants	This program is administered by DPE 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: ▪ Aboriginal Cultural Heritage grants ▪ Caring for State Heritage grants ▪ Community Heritage grants ▪ Grants for local government.
NSW Environment Trust Grants	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. 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 DPE. Suitable coastal management grant applications may relate to dune care, for example.
Crown Reserves Improvement Fund Program	Administered by DPE (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.
Federal Government	
Disaster Ready Fund	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, 2013). The DRF was established through the *Disaster Ready Fund Act 2019*. 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.
Other funding opportunities	
Landcare Grants	Landcare Australia works with governments, corporate and philanthropic organisations, and donors to facilitate funding for good quality, hands on projects and programs that will improve environmental outcomes for the Landcare community (Landcare Australia, 2023).
Coastcare Grants	Coastcare grants support community groups working on projects across Australia. Grants support Landcare and Coastcare groups with projects like dune protection, revegetation of native coastal environments, protection of endangered coastal species habitats, collection and prevention of stormwater pollution, weed and non-native plant removal, and control of human access to sensitive and vulnerable areas (Landcare Australia, 2023).

Agencies responsible for 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, 2018d), an analysis of the distribution of costs and benefits to Council, public authorities, stakeholders and the environment is recommended when preparing a CMP. During Options Assessments undertaken in Stage 3 (Water Technology, 2023b), a multi-criteria analysis was undertaken in order to assess the direct and indirect impact of each potential option on identified threats, weighted towards the level of threat.

None of the actions aim to benefit private interests, although they may do so indirectly as a consequence of improved environmental health and natural hazards resilience (e.g., to commercial businesses in the nearby area including tourism operators and hospitality).

Action ML.03 (South Mollymook Coastal Protection Works), will provide some form of private benefit to the Mollymook Golf Club, due to the position and alignment of the coastal protection works. However, this is not the primary design function of the structure, which is to protect public assets and infrastructure seaward of, and adjacent to, the golf club. Council is currently in discussion with the Golf Club to co-fund a proportion of the works, and final commitments are yet to be determined.

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 discretised 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 as "CST". It should be noted that capital costs Table 6-3 refer to the costs associated with the initial design, development, construction, and renewal of physical assets or facilities.
- Potential funding mechanisms – refer to Table 6-2.

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 6-2 Legend for Funding Sources in Table 6-3.

#	Funding Source
1	SCC Operational and Delivery Plan Process.
2	NSW Coasts and Estuary Grants Program.
3	NSW Marine Estate Management Strategy.
4	NSW Heritage Grants Program.
5	Environmental Trust Grants.
6	Landcare / Coastcare Grants.
7	TfNSW / MIDO Grants.

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#	Funding Source
8	NPWS Operating Budget.
9	DPI Recreational Fishing Trust Grants
10	Private beneficiaries

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Table 6-3 Business Plan for the CMP

ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
Strategy 1: Integrated Coastal Zone Management											
S1.01	Study Area Wide	Establish a CMP governance framework	SCC	N/A	CST	CST	CST	CST	CST	CST	1
S1.02	Study Area Wide	Establish two new Full Time Equivalent (FTE) Coast & Estuary Officer roles within Council	SCC	DPE(E&H)	$0	$2,400,000	$720,000	$960,000	$720,000	$2,400,000	1
S1.03	Study Area Wide	Develop and execute a communications plan for Stage 5 of the CMP	SCC	DPE(E&H)	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
S1.04	Study Area Wide	Develop and implement a program to monitor key environmental parameters relevant to coastal management	SCC	DPE(E&H)	$0	$275,000	$100,000	$100,000	$75,000	$275,000	1,2
S1.05	Study Area Wide	Maintain and where necessary expand upon the Council's BeachStat dashboard for the Shoalhaven LGA	SCC	DPE(E&H)	$0	$130,000	$60,000	$40,000	$30,000	$130,000	1,2
S1.06	Study Area Wide	Maintain and update the CoastSnap camera cradle locations across the Shoalhaven LGA	SCC	DPE(E&H)	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1,2
S1.07	Study Area Wide	Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure	SCC	N/A	$0	$300,000	$90,000	$120,000	$90,000	$300,000	1,2
S1.08	Study Area Wide	Enact the CMPs Monitoring, Evaluation and Reporting (MER) Program for the CMP	SCC	N/A	CST	CST	CST	CST	CST	CST	1
S1.09	Study Area Wide	Continue ongoing collaboration with state government agencies and research institutions	SCC	DPE(E&H) DPI-Fisheries NPWS Crown Lands	$0	$200,000	$60,000	$80,000	$60,000	$200,000	1
S1.10	Study Area Wide	Undertake a Feasibility Study to assess the potential for sustainable and economical utilisation of offshore sand resources for large scale beach nourishment across the LGA	SCC	DPE(E&H)	$0	$60,000	$60,000	$0	$0	$60,000	1,2
S1.11	Study Area Wide	Monitoring of locations identified as being at risk of coastal cliff and slope instability	SCC	N/A	CST	CST	CST	CST	CST	CST	1
S1.12	Study Area Wide	Feasibility investigations, design, and approvals for addressing estuary entrance instability at Mollymook Beach, Manyana Beach, and Hyams Beach	SCC	DPE(E&H) DPI-Fisheries	$0	$130,000	$130,000	$0	$0	$130,000	1
S1.13	Study Area Wide	Undertake a Planning Proposal to adopt a CVA	SCC	DPE(E&H)	CST	CST	CST	CST	CST	CST	1
Strategy 2: Community and Stakeholder Engagement											
S2.01	Study Area Wide	Develop and maintain an ongoing program of community engagement with coastal communities - about coastal hazard risk and the importance of coastal management	SCC	N/A	$0	$200,000	$60,000	$80,000	$60,000	$200,000	1,2
S2.02	Study Area Wide	Develop and maintain an ongoing program of community engagement with coastal communities about the geotechnical hazard risk and the importance of coastal management	SCC	N/A	$0	$150,000	$45,000	$60,000	$45,000	$150,000	1,2
S2.03	Study Area Wide	Provide rockfall signage for the exposed cliff lines of applicable cliffs	SCC	N/A	$0	$40,000	$40,000	$0	$0	$40,000	1
Strategy 3: Emergency Planning and Response											
S3.01	Study Area Wide	Activate the "Coastal Hazard Emergency Action Sub-Plans" (CZEAS) for each beach as required after storm events	SCC	DPE(E&H) NSW SES	$0	$1,500,000	$450,000	$600,000	$450,000	$1,500,000	1,2

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ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
S3.02	Study Area Wide	Develop a Tide Alert Calendar, and encourage citizen science in monitoring tidal inundation	SCC	N/A	$0	$34,000	$27,000	$4,000	$3,000	$34,000	1,2
Strategy 4: Planning and Adaptation											
S4.01	Study Area Wide	Review Councils coastal management planning policies every 10 years	SCC	DPE(E&H)	CST	CST	CST	CST	CST	CST	1
S4.02	Study Area Wide	Maintain planning controls to reduce future coastal hazard impacts	SCC	N/A	CST	CST	CST	CST	CST	CST	1
S4.03	Study Area Wide	Fill information gaps in Council's existing coastal hazard mapping dataset	SCC	N/A	$0	$90,000	$90,000	$0	$0	$90,000	1,2
Strategy 5: Protection of the Coastal Environment											
S5.01	Study Area Wide	Continue Councils program of mapping threatened ecological communities (TECs) across coastal reserves	SCC	DPE(E&H)	$0	$0	$0	$0	$0	$0	1,2
S5.02	Study Area Wide	Maintain and enhance ecological communities in coastal reserves (including dunes), considering appropriate ecological strategies for urban (foreshore recreation reserve) and non-urban areas	SCC	DPE(E&H)	$0	$1,000,000	$300,000	$400,000	$300,000	$1,000,000	1,2
S5.03	Study Area Wide	Engage with SLSCs in order to develop a suite of dune vegetation management plans for the coastal dunes in front of all SLSC building and lifeguard towers on patrolled beaches	SCC	N/A	CST	CST	CST	CST	CST	CST	1,2,5,6
Strategy 6: Protection of Cultural Heritage											
S6.01	Study Area Wide	Undertake a LGA wide coastal zone Aboriginal Cultural Heritage Survey, and development of local protection/management plans	SCC	Jerrinja LALC Jerrinja Tribal Group	$120,000	$108,000	$144,000	$48,000	$36,000	$228,000	1,2,5,6
S6.02	Study Area Wide	Engage with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to develop a cultural educational and awareness program	SCC	Jerrinja LALC Jerrinja Tribal Group Ulladulla LALC	$0	$85,000	$50,000	$20,000	$15,000	$85,000	1,2
S6.03	Study Area Wide	Provide opportunities and help build capacity to local Aboriginal Ranger programs, to enhance their role in management of Sea Country across the LGA	SCC	Jerrinja LALC Jerrinja Tribal Group Ulladulla LALC	CST	CST	CST	CST	CST	CST	1
Strategy 7: Asset Management											
S7.01	Study Area Wide	Review and update all Council asset management plans (AMPs), relevant to the coastal zone	SCC	N/A	$0	$500,000	$150,000	$200,000	$150,000	$500,000	1
S7.02	Study Area Wide	Implement high priority (and other relevant) actions from the hydraulic assessment report to manage stormwater drainage adjacent to or within identified coastal cliffs and slopes risk areas	SCC	N/A	$6,250,000	$0	$1,875,000	$2,500,000	$1,875,000	$6,250,000	1
S7.03	Study Area Wide	Shoalhaven Open Coast Boating Infrastructure Plan	SCC	TfNSW	$75,000	$0	$0	$75,000	$0	$75,000	1,2,9
S7.04	Study Area Wide	Continue the ongoing implementation of the Shoalhaven Beaches Asset Management Strategy and incorporate into the relevant SCC Asset Management Plan	SCC	N/A	$0	$250,000	$75,000	$100,000	$75,000	$250,000	1,7
LAP: Northern LGA											
SH.01A	Shoalhaven Heads	SLSC Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	SCC	N/A	$20,000	$0	$20,000	$0	$0	$20,000	1,2

ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
SH.01B	Shoalhaven Heads	SLSC Coastal Protection Works - Stage 2: Maintenance Works	SCC	N/A	$1,500,000	$135,000	$1,530,000	$60,000	$45,000	$1,635,000	1,2
SH.02	Shoalhaven Heads	Opportunistic nourishment of Shoalhaven Heads beach	SCC	N/A	$0	$110,000	$27,500	$55,000	$27,500	$110,000	1,2
SH.03	Shoalhaven Heads	Monitor performance of the SLSC dune restoration works	SCC	N/A	$0	$67,200	$33,600	$19,200	$14,400	$67,200	1
CH.01	Crookhaven Heads	Install drainage along the downslope side of roads and tracks to minimise overland flow erosion near the Community Nursery	SCC	N/A	$133,000	$15,960	$0	$140,980	$7,980	$148,960	1
CU.01	Culburra Beach	Passive relocation of northern access loop road when damaged by storm events - to a more landwards location within existing parcel	SCC	N/A	$394,900	$0	$394,900	$0	$0	$394,900	1
CU.02	Culburra Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
CR.01	Currarong Beach	Shoreline erosion protection structure at Beecroft Parade - Undertake investigations, detailed design, and approvals	SCC	DPE(E&H)	$80,000	$0	$80,000	$0	$0	$80,000	1,2
CR.02	Currarong Beach	Investigate and finalise options to manage long term coastal hazard risk at Currarong Beach	SCC	DPI-Fisheries Crown Lands DPE(E&H)	$100,000	$0	$100,000	$0	$0	$100,000	1,2
CR.03	Currarong Beach	Wastewater Management Plan	SCC	N/A	$50,000	$0	$0	$50,000	$0	$50,000	1
CR.04	Currarong Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$75,000	$22,500	$30,000	$22,500	$75,000	1
LAP: Jervis Bay Area											
CL.01	Callala Bay	Callala Bay Coastal Processes and Hazard Definition Study and Management Option Investigation	SCC	DPE(E&H) NPWS DPI-Fisheries	$0	$100,000	$100,000	$0	$0	$100,000	1,2
CL.02	Callala Bay	Callala Bay foreshore restoration	SCC	DPI-Fisheries Crown Lands DPE(E&H) NPWS	$267,375	$427,800	$320,850	$213,900	$160,425	$695,175	1,2
CL.03	Callala Bay	Sheaffe Street stormwater improvements	SCC	N/A	$65,000	$0	$0	$65,000	$0	$65,000	1,2
CL.04A	Callala Bay	Sailing Club Coastal Protection Works - Stage 1: Design and Approvals	SCC	N/A	$25,000	$0	$25,000	$0	$0	$25,000	1,2
CL.04B	Callala Bay	Sailing Club Coastal Protection Works - Stage 2: Implementation	SCC	N/A	$120,000	$7,200	$0	$123,600	$3,600	$127,200	1,2
CL.05	Callala Bay	Upgrade Callala Bay car park and foreshore access facilities	SCC	DPI-Fisheries Crown Lands DPE(E&H)	$149,100	$17,892	$0	$158,046	$8,946	$166,992	1
CL.06	Callala Bay	Addition of signage advising of overflow boat and trailer parking	SCC	N/A	CST	CST	CST	CST	CST	CST	1
CL.07	Callala Bay	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
CB.01	Callala Beach	Adaptation pathway for Community Hall and tennis club facilities	SCC	N/A	$50,000	$0	$0	$0	$50,000	$50,000	1
CB.02	Callala Beach	Empower local residents to engage in best practice foreshore management	SCC	N/A	CST	CST	CST	CST	CST	CST	1,2,6
CB.03	Callala Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
HU.01	Huskisson	Upgrade the Huskisson Sea Pool, as per the 2022 Detailed Design Report (Consult Marine, 2022)	SCC	N/A	$3,000,000	$0	$3,000,000	$0	$0	$3,000,000	1

ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
HU.02	Huskisson	Maintenance of the coastal protection works for the Huskisson Sea Pool	SCC	N/A	$600,000	$48,000	$606,000	$24,000	$18,000	$648,000	1,2
HU.03	Huskisson	Foreshore management works at Moona Moona Creek Entrance	SCC	N/A	$55,000	$0	$0	$55,000	$0	$55,000	1
HU.04	Huskisson	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
CW.01	Collingwood Beach	Stormwater Management Plan for Collingwood Beach	SCC	N/A	$50,000	$0	$0	$50,000	$0	$50,000	1
CW.02	Collingwood Beach	Stormwater outlet upgrade at Church St	SCC	N/A	$250,000	$0	$0	$250,000	$0	$250,000	1
CW.03	Collingwood Beach	Stormwater outlet upgrade at Bayswater Rd	SCC	N/A	$250,000	$0	$0	$250,000	$0	$250,000	1
CW.04	Collingwood Beach	Adaptation / protection of Wastewater Assets	SCC	N/A	$15,000	$0	$15,000	$0	$0	$15,000	1
CW.05	Collingwood Beach	Adaptation / protection of Wastewater Assets	SCC	N/A	$15,000	$0	$15,000	$0	$0	$15,000	1
CW.06	Collingwood Beach	Continue Collingwood Beach dune regeneration works	SCC	N/A	$0	$176,400	$88,200	$50,400	$37,800	$176,400	1,5,6
CW.07	Collingwood Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
VN.01	Vincentia	Undertake dune restoration at Nelsons Beach	SCC	N/A	$57,500	$69,000	$0	$92,000	$34,500	$126,500	1,2,6
VN.02	Vincentia	Vegetation planting on Vincent Street to help improve foreshore slope stability	SCC	N/A	$35,000	$14,000	$0	$0	$49,000	$49,000	1,2,6
VN.03	Vincentia	Provide dinghy storage	SCC	N/A	$25,000	$0	$0	$0	$25,000	$25,000	1
HY.01	Hyams Beach	Little Hyams Beach dune management	SCC	N/A	$0	$105,600	$0	$76,800	$28,800	$105,600	1,6
LAP: Central LGA											
CD.01	Cudmirrah Beach	Investigate land use planning options to provide enhanced protection to the local dune system	SCC	N/A	CST	CST	CST	CST	CST	CST	1
BR.01	Berrara	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
BN.01	Bendalong	Foreshore restoration works at the Bendalong foreshore	SCC	N/A	$0	$196,000	$98,000	$56,000	$42,000	$196,000	1,2,6
BN.02	Bendalong	Washerwomans Beach dune restoration	SCC	N/A	$0	$214,500	$0	$156,000	$58,500	$214,500	1,2,6
BN.03	Bendalong	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$100,000	$30,000	$40,000	$30,000	$100,000	1
BN.04	Bendalong	Investigate the most appropriate way to direct stormwater from Holly Street	SCC	N/A	$15,000	$0	$0	$0	$15,000	$15,000	1
BN.05	Bendalong	Upgrade of local stormwater outlet, including appropriately engineered scour protection	SCC	N/A	$300,000	$135,000	$330,000	$60,000	$45,000	$435,000	1,2
IN.01	Inyadda Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
MN.01	Manyana Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
CJ.01	Cunjurong Point	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
CJ.02	Conjola Area	Opportunistic nourishment of beaches adjacent to Conjola	SCC	N/A	$0	$275,000	$82,500	$110,000	$82,500	$275,000	1,2
NA.01	Narrawallee Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
NA.02	Narrawallee Beach	Dune maintenance	SCC	N/A	$0	$67,200	$33,600	$19,200	$14,400	$67,200	1,2,6
ML.01	Mollymook Beach	Stormwater outfall works and dune restoration	SCC	N/A	$200,000	$90,000	$220,000	$40,000	$30,000	$290,000	1,2,6
ML.02	Mollymook Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
ML.03	Mollymook Beach	South Mollymook Coastal Protection Works	SCC	DPE(E&H)	$12,000,000	$1,080,000	$12,240,000	$480,000	$360,000	$13,080,000	1,2,10

ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
ML.04	Mollymook Beach	Landslide area rehabilitation at Mitchell Parade	SCC	N/A	$185,000	$0	$185,000	$0	$0	$185,000	1,2
ML.05	Mollymook Beach	Landslide risk management (LRM) recommendations for lookout at Bannisters Point	SCC	N/A	$75,000	$0	$75,000	$0	$0	$75,000	1,2
ML.06	Mollymook Beach	Dune restoration and access management at South Mollymook	SCC	N/A	$0	$418,000	$0	$304,000	$114,000	$418,000	1,2,6
ML.07	Mollymook Beach	Sand Scraping and dune restoration at North Mollymook	SCC	N/A	$0	$187,000	$0	$136,000	$51,000	$187,000	1,2,4,6
CO.01	Golf Course Reef Beach	Upgrade Golf Course Reef Beach car park and foreshore access facilities	SCC	Ulladulla LALC	$219,400	$26,328	$0	$232,564	$13,164	$245,728	1
CO.02	Collers Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
CO.03	Collers Beach	Dune restoration and carpark upgrade at Collers Beach	SCC	N/A	$171,000	$205,200	$0	$273,600	$102,600	$376,200	1,2,6
UL.01	Ulladulla Harbour	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$50,000	$15,000	$20,000	$15,000	$50,000	1
UL.02A	Ulladulla Harbour	Princes Highway Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	SCC	TfNSW	$25,000	$0	$25,000	$0	$0	$25,000	1,2
UL.02B	Ulladulla Harbour	Princes Highway Coastal Protection Works - Stage 2: Maintenance works	SCC	TfNSW	$400,000	$32,000	$404,000	$16,000	$12,000	$432,000	1,2
UL.03	Ulladulla Harbour	Foreshore restoration works at Central Harbour Beach	SCC	N/A	$0	$53,200	$0	$0	$53,200	$53,200	1,2,6
UL.04	Ulladulla Harbour	Install dinghy racks	SCC	N/A	$20,000	$0	$0	$0	$20,000	$20,000	1
UL.05	Ulladulla Harbour	Erosion monitoring at South Ulladulla Harbour Beach	SCC	N/A	CST	CST	CST	CST	CST	CST	1,2
LAP: Southern LGA											
RN.01	Rennies Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
RA.01	Racecourse Beach	Investigate land use planning options to provide enhanced protection to the local dune system	SCC	N/A	CST	CST	CST	CST	CST	CST	1
BU.01	Burrill Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
BU.02	Burrill Beach	Investigate land use planning options to provide enhanced protection to the local dune system	SCC	N/A	CST	CST	CST	CST	CST	CST	1
WR.01	Wairo Beach	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
WR.02	Wairo Beach	Investigate land use planning options to provide enhanced protection to the local dune system	SCC	N/A	CST	CST	CST	CST	CST	CST	1
WR.03	Lake Tabourie	Maintain, repair, upgrade, and rationalise beach access tracks	SCC	N/A	$0	$25,000	$7,500	$10,000	$7,500	$25,000	1
BW.01	Bawley Beach	Dune building and restoration	SCC	N/A	$17,350	$20,820	$0	$27,760	$10,410	$38,170	1,2,6
BW.02	Bawley Point Headland	Upgrade and formalise parking facilities and pedestrian access to the Bawley Point Headland and the Gantry	SCC	N/A	$387,200	$0	$0	$387,200	$0	$387,200	1
CM.01	Cormorant Beach	Develop an entrance management policy for the Cormorant Beach Lagoon	SCC	N/A	$25,000	$0	$0	$25,000	$0	$25,000	1,2
CM.02	Cormorant Beach	Install a water level gauge in the Cormorant Beach Lagoon	SCC	N/A	$20,000	$0	$20,000	$0	$0	$20,000	1,2
CM.03	Cormorant Beach	Cormorant beach pedestrian access management	SCC	N/A	$22,500	$9,000	$0	$0	$31,500	$31,500	1,2,6
KI.01A	Kioloa Beach	Kioloa Coastal Protection Works - Stage 1: Condition assessment and maintenance recommendations report	SCC	N/A	$35,000	$0	$35,000	$0	$0	$35,000	1,2

ID	Locality	Action Name	Lead Agency	Support Partners	Capital Cost	Operational and Maintenance Costs	Years 1-3 DP 2022-2026	Years 4-7 DP 2026-2030	Years 8-10 DP 2030-2034	Total Cost	Funding Mechanisms
KI.01B	Kioloa Beach	Kioloa Coastal Protection Works - Stage 2: Maintenance works	SCC	N/A	$3,000,000	$240,000	$3,030,000	$120,000	$90,000	$3,240,000	1,2
KI.02	Kioloa Beach	Stormwater formalisation along seaward end of Scerri Drive	SCC	N/A	$38,000	$6,080	$38,760	$3,040	$2,280	$44,080	1,2
ME.01	Merry Beach	Formalise access and increase foreshore resilience	SCC	N/A	$111,500	$44,600	$0	$0	$156,100	$156,100	1,2,6
DP.01	Depot Beach	Long term adaptation pathway for the Depot Beach vehicle access track	SCC	NPWS	CST	CST	CST	CST	CST	CST	1
DP.02	Depot Beach	Dune building and restoration	NPWS	SCC	$140,000	$28,000	$0	$0	$168,000	$168,000	1,6,8
DU.01	North Durras Beach	Foreshore management works at the North Durras Creek entrance	SCC	NPWS	$40,000	$0	$0	$40,000	$0	$40,000	1
						Subtotal	**$27,968,910**	**$9,967,290**	**$6,236,605**	**$44,172,805**	

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6.5 Council's LGA Wide CMP Action Implementation Plan

Once Council's entire suite of CMPs has been developed, it will be necessary to formulate an LGA-wide action plan that prioritises and rationalises actions from all of them for implementation. The prioritisation methodology described in Section 4.2.3 could be used as a basis for this, with an LGA-wide Action Implementation Database containing Actions from all CMPs used to track progress and outcomes.

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7 COASTAL ZONE EMERGENCY ACTION SUBPLAN

The CM Act requires that a Coastal Zone Emergency Action Subplan (CZEAS) be included in the CMP if the study area contains land within the CVA and beach erosion, coastal inundation or cliff instability is occurring on that land. The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation, and coastal cliff and slope instability. Specifically, Section 15 (3) of the CM Act states that:

> *"A **coastal zone emergency action subplan** is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of **beach erosion**, **coastal inundation** or **cliff instability**, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event."*

The Shoalhaven Open Coast and Jervis Bay are subject to the coastal hazards of beach erosion, coastal inundation, and coastal cliff and slope instability within the CVA. Consequently, a CZEAS has been prepared in accordance with the mandatory requirements for the CZEAS specified in the CM Act and accompanying CM Manual (OEH, 2018a). The CZEAS for the CMP is contained in Appendix B.

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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.

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, 2018f), 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 describes how the program is intended to work by linking activities with outputs, intermediate impacts 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 6-1 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: "Has the program of management actions been implemented in accordance with the implementation plan?"
- **Component 2: Relevant environmental parameters**. As per Section 1.3, one of the main goals of the CMP is to improve the environmental and social values of the coastline. Therefore, the MER should also include a component that monitors key environmental parameters – see Section 8.3.
  - It aims to answer the question: "Has the implementation of individual management actions, and the integrated CMP more generally, resulted in an improvement in the health of the coastal environment and the social / cultural values of the study area?".
- **Component 3: 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 more broadly achieved its intended objectives?"
    - "How has the CMP made a difference?" and
    - "Has the level of risk associated with the various stressors and hazards facing the coastline been reduced?".

The 3 components of the MER are described in more detail in Section 8.2 to 8.4.

Implementation of the MER is specifically listed as Action S1.08 in the CMP (see Section 4.3).

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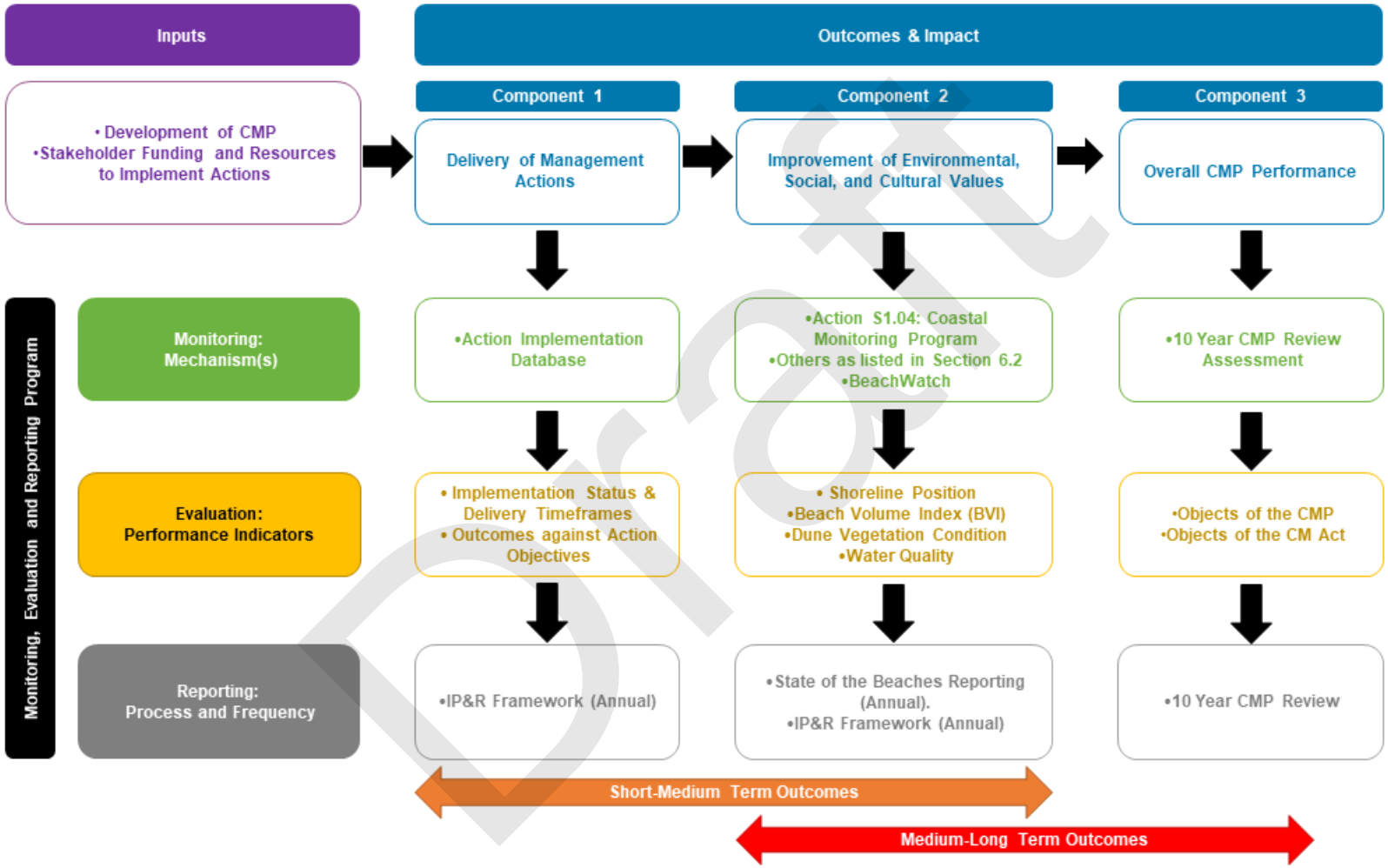

Figure 8-1 Overview of MER program for the CMP

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

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

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

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

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

8.3 Component 2: Environmental Parameters and Indicators

A key component of the MER process will be to utilise 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.

It should be noted that while the monitoring of environmental indicators is important to ascertain the health state and/or condition of the coastal environment, it cannot always be reliably used to determine the short term "success" of individual management actions. This is because the physical processes affecting the coastal zone act over a wide range of timeframes including short term (storm erosion and recovery, seasonal effects), medium term (beach rotation and impacts related to the El Niño Southern Oscillation) and long term (such as responses to sediment budget imbalances and climate change impacts such as SLR). For this reason, environmental indicators can demonstrate variability over short-, medium- and long-term cycles that may range from several days, to years or even decades. Furthermore, the cause and effect of such variability may not

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always be readily understood, nor easily detected in a short-term dataset. In this context, linking short to medium term changes in environmental indicators to specific stressors, or the impact of CMP management actions, can often be fraught with complexity.

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

With this in mind, 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 S1.04: Develop and implement a program to monitor key environmental parameters relevant to coastal management.

Additional Actions include:

- Action S1.05 Maintain and where necessary expand upon the Council's BeachStat dashboard for the Shoalhaven LGA.
- Action S1.06: Maintain and update the CoastSnap camera cradle locations across the Shoalhaven LGA.
- Action S1.07: Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure.
- Action S1.11: Monitoring of locations identified as being at risk of coastal cliff and slope instability.

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 (DPE, 2023).
- Annual State of the Beach Reporting.

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 S1.04 (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 Objects of the CMP and CM Act

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

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

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

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

Review of Key Issues

The primary mechanism for gauging whether the CMP has been successful should be the re-evaluation of the threats and risks across the study area through a repeat of the Stage 2 Risk Assessment (Water Technology, 2023a). 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 very high or high threats been adequately managed?
- Are there any new or emerging threats that need to be captured?

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

Assess CMP Performance

This will subsequently 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 garnered and compiled from the monitoring programs set forth 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 1-1).
- Coastal sediment compartment mapping across the south coast region, including the study area (Figure 1-2).

Furthermore, a detailed companion mapping set has also been provided in Appendix A. This mapping set includes a suite of 20 local level maps with the following information:

- Locality plan and land tenure – which includes details regarding key beaches, headlands, coastal features and major townships. It also includes land tenure arrangements such as Council Reserves, Crown Land Reserves, NPWS Estate, and NSW Marine Park Areas.
- RH SEPP Coastal Management Areas – including the state government mapping of CUA, CEA, and CWLR areas.

Maps of individual management actions are provided in Section 4.

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APPENDIX A
COMPANION MAPPING SET

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Exeter
Dunmore
Curramore
Budderoo
Bombo
Bundanoon
Meryla
Penrose
Kiama
Jerrara
Wingello
Marulan
Tallong
Red Rocks
Beaumont
Shoalhaven Heads
Bungonia
Tallowal
Nowra
Numbaa
Culburra Beach
Yalwal
Quiera
Comberton
Parma
Callala Beach
Currarong Beach
Tomerong
Huskisson
Collingwood
Bulee
SHOALHAVEN
Vincentia
Vicentia
St George
Sassafras
Bewong
Hyams Beach
Nerriga
Oallen
JERVIS BAY TERRITORY
Berrara
Corang
Bendalong
Tomboye
Bendalong
Manyana
Marlowe
Endrick
Milton
Narrawallee
South Pacific Ocean
Mollymook
Ulladulla
Ulladulla
Yadboro
Rennies Beach
Dolphin Point
Morton
Lake Tabourie
Budawang
Termeil
Mogood
Brooman
Bawley Point
Kioloa
Kioloa
Monga
Currowan
North Durras and Depot Beach
Nelligen
Batemans Bay
Runnyford
Queensland
New South Wales
Sydney
Victoria
South Pacific Ocean

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LEGEND

Map Extent

LGA Boundary

0 2.5 5 10 15 Kilometers

1:350,000 at A3

Shoalhaven City Council

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

Mapping Overview

Shoalhaven Open Coast and Jervis Bay CMP

REFERENCE: M:\21010472_Shoalhaven Open Coast CMP\Spatial\Workspaces\Figures\21010472_Locality_Plan.aprx

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Locality Plan and Land Tenure

R&H SEPP Coastal Management Areas

Seven Mile Beach National Park

BERRY

COOLANGATTA

SHOALHAVEN HEADS

South Pacific Ocean

Shoalhaven River

Shoalhaven Heads

Berrys Bay

Bevan Creek

COMERONG ISLAND

Comerong Island Nature Reserve

Comerong Island

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- NPWS Estate
- NSW Marine Parks
- Coastal Environment Area
- Coastal Wetland
- Coastal Wetland Proximity Area
- Coastal Use Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:16,000 at A3

WATER TECHNOLOGY
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Fig A2: Shoalhaven Heads

Shoalhaven Open Coast and Jervis Bay CMP

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- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:25,000 at A3

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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Fig A3: Culburra Beach

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

South Pacific Ocean

Abrahams Head
Honeysuckle Point
Wilsons Beach
Lobster Bay Beach
Abrahams Bosom Beach
Peels Reef
Plutus Reef
Millers Creek
Plutus Creek
Currarong Beach
CURRARONG
Currarong Creek
Blacks Cave Creek
Abrahams Bosom Creek
BEECROFT PENINSULA
Snake Inlet

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Coastal Environment Area
Coastal Wetland
Coastal Wetland Proximity Area
Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:18,000 at A3

WATER TECHNOLOGY
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Fig A4: Currarong Beach

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

Jervis Bay National Park
Wowly Gully
Boorawine Creek
Callala Point
CALLALA BAY
WOLLUMBOOLA
Callala Creek
Jervis Bay
CALLALA BEACH
COMBERTON
Callala Beach
Bid Bid Creek
MYOLA

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Coastal Wetland
Coastal Wetland Proximity Area
Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:23,000 at A3

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Fig A5: Callala Beach

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

Myola Beach
Currambene Creek
MYOLA
Jervis Bay
Shark Net Beach
HUSKISSON
Tapalla Point
Jervis Bay National Park
Huskisson Beach
Moona Moona Creek
VINCENTIA

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- Coastal Wetland
- Coastal Wetland Proximity Area
- Coastal Use Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:10,000 at A3

WATER TECHNOLOGY
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Fig A6: Huskisson

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

HUSKISSON

Moona Moona Creek

Collingwood Beach

Jervis Bay

Jervis Bay National Park

VINCENTIA

Orion Beach

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- Coastal Use Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:10,500 at A3

WATER TECHNOLOGY
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Fig A7: Collingwood

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- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:11,000 at A3

WATER TECHNOLOGY
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Fig A8: Vicentia

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

Greenfield Gully
Greenfield Beach
VINCENTIA
Jervis Bay National Park
Duck Gully
Chinamans Beach
Jervis Bay
Hyams Point
Hyams Point Beach
HYAMS BEACH

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Coastal Environment Area
Coastal Wetland
Coastal Wetland Proximity Area
Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:10,500 at A3

WATER TECHNOLOGY
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Fig A9: Hyams Beach

Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

Conjola National Park
Tea tree Creek
MONDAYONG
SUSSEX INLET
Sussex Inlet
The Haven Lookout
SWANHAVEN
Swan Lake
Sussex Inlet Beach
Cudmirrah Beach
CUDMIRRAH
Swan Lake
BERRARA
Berrara Beach
Berrara Creek
Berrara Point Beach
Berrara South Beach
South Pacific Ocean

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Coastal Wetland
Coastal Wetland Proximity Area
Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:29,000 at A3

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Fig A10: Berrara

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R&H SEPP Coastal Management Areas

MONDAYONG
Monument Beach
Flat Rock Beach
Dee Beach
South Pacific Ocean
Washerwomans Creek
Conjola National Park
Washerwomans Beach
Boat Harbour Beach
BENDALONG
Red Head/One Tree Beach
Red Head
Bendalong/Inyadda Beach
MANYANA

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- Coastal Use Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:12,000 at A3

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Fig A11: Bendalong

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R&H SEPP Coastal Management Areas

Conjola National Park
CONJOLA
BENDALONG
Berringer Lake
BERRINGER LAKE
MANYANA
Manyana North Beach
Inyadda Point
Manyana Beach
CUNJURONG POINT
Cunjurong Point
Conjola Lake
Cunjurong Beach
LAKE CONJOLA
Green Island
South Pacific Ocean

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Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:15,000 at A3

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Fig A12: Manyana

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R&H SEPP Coastal Management Areas

Narrawallee Creek Nature Reserve
LAKE CONJOLA
Narrawallee Creek
Narrawallee Inlet
Narrawallee Beach
NARRAWALLEE
South Pacific Ocean
MOLLYMOOK BEACH
Mollymoke Farm Creek
Jones Beach
Bannisters Point

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Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:12,500 at A3

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Fig A13: Narrawallee

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R&H SEPP Coastal Management Areas

NARRAWALLEE

MOLLYMOOK BEACH

MOLLYMOOK

ULLADULLA

Jones Beach

Bannisters Point

Mollymoke Farm Creek

Mollymook Creek

Mollymook Beach

Blackwater Creek

Millards Creek

Collers Beach

South Pacific Ocean

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Coastal Use Area
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Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:13,000 at A3

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Fig A14: Mollymook

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0 250 500 1,000 Meters

1:13,000 at A3

WATER TECHNOLOGY
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Fig A15: Ulladulla

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Millards Creek
Ulladulla Pool Beach
Rocky Bay Beach
Warden Head North Beach
ULLADULLA
Warden Head South Beach
Warden Head
Racecourse Creek
Racecourse Beach
Racecourse South Beach
South Pacific Ocean
BURRILL LAKE

R&H SEPP Coastal Management Areas

Millards Creek
Ulladulla Pool Beach
Rocky Bay Beach
Warden Head North Beach
ULLADULLA
Warden Head South Beach
Warden Head
Racecourse Creek
Racecourse Beach
Racecourse South Beach
South Pacific Ocean
BURRILL LAKE

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Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:18,500 at A3

WATER TECHNOLOGY
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Fig A16: Rennies Beach

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R&H SEPP Coastal Management Areas

WOODBURN
Burrill Lake
Stony Creek
BURRILL LAKE
Burrill Beach
Burrill Inlet
Smithys Point
South Pacific Ocean
DOLPHIN POINT
Meroo National Park
Lagoon Head
LAKE TABOURIE

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Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:13,000 at A3

WATER TECHNOLOGY
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Fig A17: Dolphin Point

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R&H SEPP Coastal Management Areas

WOODBURN
Meroo National Park
Brandaree Creek
Tabourie Creek
LAKE TABOURIE
Tabourie Point
Crampton Island
South Pacific Ocean
Lemon Tree Creek
Tabourie Beach
TERMEIL

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Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:13,000 at A3

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Fig A18: Lake Tabourie
Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

Meroo National Park
Willinga Point
Willinga Lake
Bawley Beach
Bawley Point
Cormorant Beach
Juwin Head
Gannet Beach
South Pacific Ocean
BAWLEY POINT
Murramarang Beach
Limpid Lagoon
Murramarang Point
Murramarang Aboriginal Area
Cat And Kitten Beach
Wilfords Point
Bull Pup Beach
Bull Pup Point
Brush Island Nature Reserve
Racecourse Beach

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Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:19,000 at A3

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Fig A19: Bawley Point
Shoalhaven Open Coast and Jervis Bay CMP

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R&H SEPP Coastal Management Areas

BAWLEY POINT
Racecourse Beach
Bull Pup Beach
Bull Pup Point
Shelly Beach
Shelly Point
Butlers Creek
Avenue Beach
KIOLOA
Murramarang National Park
Butlers Point
Belowla Island Nature Reserve
COCKWHY
Kioloa Beach
Boat Ramp Beach
O'Hara Head
Merry Beach
Snapper Point Lookout
PRETTY BEACH
South Pacific Ocean

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Coastal Environment Area
Coastal Wetland
Coastal Wetland Proximity Area
Coastal Use Area
Littoral Rainforest
Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:19,500 at A3

WATER TECHNOLOGY
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Fig A20: Kioloa

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R&H SEPP Coastal Management Areas

EAST LYNNE
PEBBLY BEACH
DURRAS NORTH
DEPOT BEACH
Depot Beach
Tranquility Bay Beach
Murramarang National Park
South Pacific Ocean
Point Upright
Durras Lake

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S

- CMP Study Area
- Council Reserve
- Crown Land Reserve
- NPWS Estate
- NSW Marine Parks
- Coastal Environment Area
- Coastal Wetland
- Coastal Wetland Proximity Area
- Coastal Use Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 250 500 1,000 Meters

1:18,500 at A3

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WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

Shoalhaven City Council

Fig A21: North Durras and Depot Beach

Shoalhaven Open Coast and Jervis Bay CMP

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APPENDIX B
COASTAL ZONE EMERGENCY ACTION SUBPLAN

Draft





Coastal Zone Emergency Action Subplan

Shoalhaven Open Coast and Jervis Bay CMP

Shoalhaven City Council

25 November 2023

Document Status

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CONTENTS

GLOSSARY AND ABBREVIATIONS IV

1 INTRODUCTION 1
1.1 Background 1
1.2 Purpose and Objectives 1
1.3 Consultation 2
1.4 Overview of this CZEAS 2

2 SCOPE OF THE CZEAS 4
2.1 Coastal Hazards 4
2.2 What is an Emergency? 5
2.3 Coastal Emergencies Covered by the CZEAS 6

3 TRIGGERS FOR EMERGENCY ACTION 10
3.1 Overview 10
3.2 Hazard Forecasts 10
3.3 Local Impact Triggers and Forecasts 12

4 AREAS AT RISK 16
4.1 Overview 16
4.2 Coastal Erosion and Inundation 16
4.3 Coastal Cliff and Slope Instability 18

5 ROLES AND RESPONSIBILITIES 22

6 COMMUNICATION PROTOCOLS 27
6.1 Overview 27
6.2 Message Construction 27

7 EMERGENCY RESPONSE ACTION PLAN 32
7.1 Overview 32
7.2 Study Area Wide Actions 32
7.3 Local Beach Sub-Plans & Mapping 38
7.4 Local Headland Mapping & Inspection Template 39
7.5 Recording Coastal Emergency Impacts and Emergency Response Actions 39

8 APPROVALS PATHWAYS 40

9 REFERENCES 41

APPENDICES

Appendix A Beaches – Local Area Plans
Appendix B Coastal Cliffs and Slopes - Inspection Tempates and Companion Mapping
Appendix C Overview of NABE

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LIST OF FIGURES

Figure 1-1 Quick reference overview of this CZEAS 3
Figure 2-1 Stages of Emergency Planning 6
Figure 2-2 Simplified legislative framework for emergency management in NSW and its relationship with coastal management legislation and coastal management programs 8
Figure 3-1 Coastal flooding (left) and beach erosion (right) hazard scales (Leaman, et al., 2021) 12
Figure 4-1 Areas affected by Coastal Cliff and Slope Instability (Douglas Partners, 2023) 19
Figure 6-1 Australian Warning System messaging model (top) and hazard icons (AIDR, 2021) 29
Figure 8-1 Coastal protection works: assessment pathway for public authorities (including councils). Source: DPE. 40

LIST OF TABLES

Table 2-1 Planning hierarchy for coastal hazards across the study area 9
Table 3-1 Available Sources of data for coastal hazard parameters 14
Table 3-2 Early Warning Parameters for Coastal Erosion and Inundation Impacts 15
Table 4-1 Areas that may be subject to immediate coastal hazard risk 16
Table 4-2 Areas that may be subject to coastal cliff and slope instability risk 20
Table 5-1 Roles and Responsibilities 22
Table 6-1 Communication Protocols 27
Table 6-2 Warning Levels from the Australian Warning System framework (AIDR, 2021) 28
Table 6-3 Examples of Australian Warning System calls to action (AIDR, 2021) that may be used in a coastal emergency 30
Table 7-1 Coastal Emergency Actions: Phase 1 – Prevention 32
Table 7-2 Coastal Emergency Actions: Phase 2 – Preparedness 33
Table 7-3 Coastal Emergency Actions: Phase 3 – Response 34
Table 7-4 Coastal Emergency Actions: Phase 4 – Recovery 36
Table 7-5 Local Area Sub-Plans 38

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GLOSSARY AND ABBREVIATIONS

Term	Definition
AIDR	The Australian Institute for Disaster Resilience
Beach erosion	Landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers: wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.
BoM	Bureau of Meteorology
Council	Shoalhaven City Council
CM Act	*The Coastal Management Act 2016*
Coastal cliff and slope instability	Geotechnical instabilities on coastal cliffs and bluffs, including rock falls, slumps, and landslides.
Coastal emergency	An emergency due to actual or imminent coastal inundation, coastal erosion, or coastal cliff and slope instability which (a) threatens endangers, or threatens to endanger, the safety or health of persons; or (b) destroys or damages, or threatens to destroy or damage, any property or the natural environment.
Coastal inundation	Coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g., dunes, seawalls).
Coastal protection works	The CM Act defines coastal protection works as: a) beach nourishment b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments, and groynes.
Combat Agency	The agency identified in this subplan as the agency primarily responsible for controlling the response to a particular emergency (SERM Act 1989).
CZEAS	Coastal Zone Emergency Action Subplan (this document)
DPE	NSW Department of Planning and Environment
ECL	East Coast Low
EMPLAN	Emergency Management Plan
Essential infrastructure	Defined in the CM Act as infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rail, roads, gas, sewerage systems, water supply systems or stormwater management systems, airports, ports shipping and harbours.
Estuary	The CM Act defines an estuary as any part of a river, lake, lagoon, or coastal creek that is affected by coastal tides, up to the highest astronomical tide.
FRNSW	Fire and Rescue NSW
Hs	Significant Wave Height - the average of the highest one third of waves during a specific period.
LEMC	Local Emergency Management Committee. The LEMC is constituted under the SERM Act for each local government area and is responsible for preparing plans for response and recovery from emergencies.

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Term	Definition
LEMO	Shoalhaven City Council Local Emergency Management Officer
Local Emergency Operations Controller (LEOCON)	A Police Officer appointed by the District Emergency Operations Controller as the Local Emergency Operations Controller for the Local Government Area.
LGA	Local Government Area
MHWS	Mean High Water Springs. The long-term mean of the heights of 2 successive high waters during those periods of 24 hours (approximately once a fortnight) when the range of tide is greatest, during full and new moon.
NABE	Nature Assisted Beach Enhancement - sometimes referred to as beach scraping.
NSW SES	NSW State Emergency Service
RFS	NSW Rural Fire Service
SERM Act	*State Emergency and Rescue Management Act 1989*
Wave Run-up	The vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.

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1 INTRODUCTION

1.1 Background

This Coastal Zone Emergency Action Subplan (CZEAS) forms part of the Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP). This CZEAS applies to the beaches, headlands, and coastal communities within the Shoalhaven Local Government Area (LGA). It has been prepared based on the requirements of:

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

1.2 Purpose and Objectives

As specified in the CM Act, a CZEAS is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to coastal emergency events immediately preceding or during periods of beach erosion, coastal inundation, or coastal cliff and slope instability, where those processes occur through storm activity or an extreme or irregular event.

Subsequently, this CZEAS details arrangements for the four phases of emergency events (prevention, preparation, response, and recovery) relating to coastal hazards for the Shoalhaven Open Coast and Jervis Bay.

In accordance with the New South Wales (NSW) Guideline for preparing a coastal zone emergency action subplan (DPIE, 2019), the purpose of this CZEAS is to identify and facilitate the implementation of appropriate emergency response actions in order to:

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

The objectives of this CZEAS are to:

- Set a clear definition for what constitutes a coastal emergency (Section 2), and associated triggers for emergency response actions (Section 3).
- Identify the locations that may be affected by beach erosion, coastal inundation, or coastal cliff and slope instability that would constitute a coastal emergency (Section 4).
- Outline the roles and responsibilities of all public authorities, including Shoalhaven City Council (Council), and coordinate their response to emergencies immediately preceding or during periods of beach erosion, coastal inundation and coastal cliff and slope instability (Section 5).
- Outline the communications required in the four phases of emergency management (Section 6).
- Summarise key actions to be carried out in the four phases of emergency (Section 7).
- Identify approvals pathways for CZEAS actions as they relate to the NSW Coastal Management Framework (Section 8).

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1.3 Consultation

Agencies other than Council involved in the implementation of this CZEAS, such as NSW Department of Planning and Environment (DPE), NSW State Emergency Service (SES), and approval agencies will be provided a copy of the draft CZEAS for review and comment. The final CZEAS will address any feedback received. This section of the final CZEAS will document the consultation that has taken place with other public authorities in preparing this CZEAS.

1.4 Overview of this CZEAS

A quick-reference overview of the contents of this CZEAS is provided in Figure 1-1.

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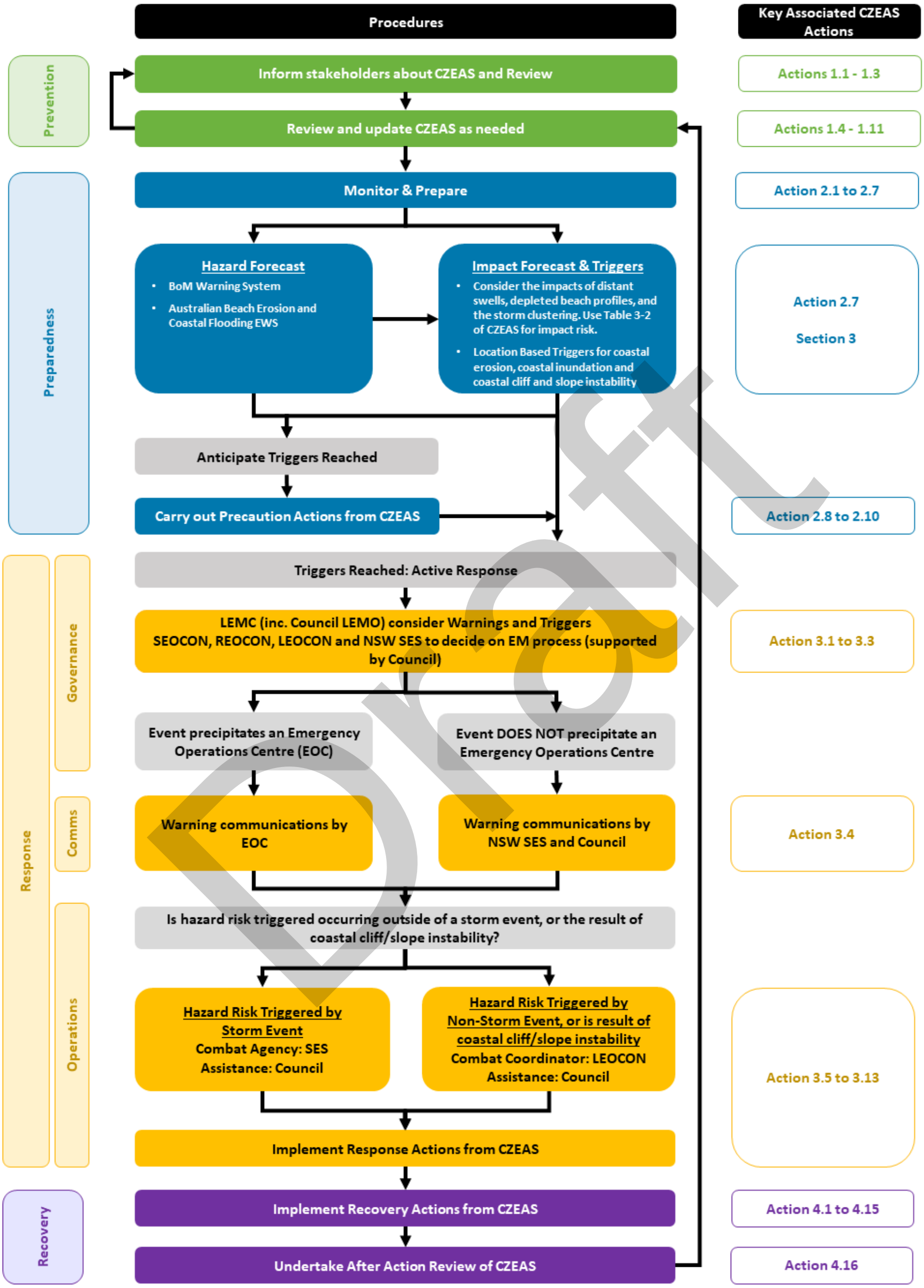

Figure 1-1 Quick reference overview of this CZEAS

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2 SCOPE OF THE CZEAS

2.1 Coastal Hazards

2.1.1 Definitions of Coastal Hazards

The NSW 2017 State Level Risk Assessment (NSW Office of Emergency Management, 2017) classifies storm and coastal erosion as priority hazards that pose a significant risk to the state. The CM Act identifies three types of coastal hazards that should be considered when developing a CZEAS These are defined in the guidelines (DPIE, 2019) as :

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

2. Coastal inundation: Coastal inundation occurs when marine and atmospheric forces combine and raise water levels at the coast (or inside estuaries) above normal elevations causing dry land to be inundated by seawater. Coastal inundation is often associated with storms and results in elevated still water levels (storm surge), wave set-up, wave runup and over-wash flows. Storm surges and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. This may result in the inundation of roads and low-lying land adjacent to estuaries.

3. Coastal cliff and slope instability: This refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps, and landslides. These may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows generated by extreme rainfall. Instability may occur during or following a coastal storm event but may also occur at other times. There may be very little warning that a coastal cliff or slope instability incident is imminent. These hazards may endanger life and property at the site of the process (e.g., through collapse of a lookout platform or walking track, or undermining of dwellings), and at the toe of the cliff or bluff (rock platform or beach).

As stipulated in the *NSW Guideline for preparing a coastal zone emergency action subplan* (DPIE, 2019), the other coastal hazards identified in the CM Act are outside the scope of this CZEAS – including long term shoreline recession, coastal lake or watercourse entrance instability, tidal inundation, and erosion and inundation of estuary foreshores caused by tidal waters and the action of waves. These hazards either pertain to estuary environments outside the scope of this CMP, or are not related to storm activity or an extreme or irregular event.

2.1.2 Storm Clustering

From a coastal hazard perspective, it is important to note the impacts of storm clustering. An erosion storm cluster occurs when a beach is unable to adequately recover from a previous storm event before a subsequent one commences. The response of a beach to a storm and a storm cluster will depend largely on the physical characteristics of that particular beach, including sediment type, shoreline orientation and wave climate (Geoscience Australia, 2021).

In this way, a cluster of less severe storm events can generate a greater erosion response than an individual, high severity event (Gravois, Baldock, Callaghan, Daivies, & Nichol, 2018).

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2.1.3 Local Hazard Exposure

When considering beach erosion and coastal inundation, the direction of wave approach is a significant factor in determining the level of risk that applies to various locales within the study area. For example, north-facing beaches (Currarong, Bendalong Boat Harbour and the south corner of Culburra and Mollymook) are particularly exposed to storm waves from the east and north-east, such as occurred during the June 2016 ECL event. Other beaches, including Collingwood and Callala Beach and the northern ends of the open coast beaches, are more exposed to storm waves approaching from the south.

This means that, during a coastal emergency, not all the areas indicated on the immediate coastal hazard maps would be expected to be impacted equally across a given beach compartment – and the degree of impact will depend on the approach direction of the storm, as well as the astronomical tide when the storm occurs. For example, the June 2016 and May-June 1974 storm events coincided with spring tides, which exacerbated the impact of those storms on coastal erosion and wave inundation (Advisian, 2018b).

2.1.4 Cascading and Compounding Emergencies

The Shoalhaven coastline is impacted by East Coast Lows (ECLs), and this phenomenon is one of the most significant contributing factors to the occurrence and intensity of coastal hazard emergencies along the NSW coast. ECLs are intense low-pressure systems that occur off the east coast of Australia. They bring damaging winds and surf, as well as heavy rainfall, which leads to erosion and flooding (AdaptNSW, 2023).

Consequently, coastal hazards emergencies do not always occur at a localised scale, nor with a single discrete hazard type. When facing events like an ECL, the consequences can be multifaceted. Coastal erosion and inundation may be occurring at numerous beaches concurrently, while the same event may also generate rainfall that leads to riverine or estuarine flooding, and potential coastal cliff and slope instability.

In this way, cascading and compounding natural hazard emergencies can place significant strain on the resources and capabilities of combat agencies during response efforts. These concurrent crises require a coordinated response from multiple agencies and authorities.

2.2 What is an Emergency?

2.2.1 Definition

An “emergency” is defined in the *State Emergency and Rescue Management Act 1989* (SERM Act) and the State Disaster Plan as:

> “*An emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which -*
>
> *a) endangers, or threatens to endanger, the safety or health of persons or animals in the State; or*
>
> *b) destroys or damages, or threatens to destroy or damage, any property in the State, or*
>
> *c) causes a failure of, or a significant disruption to, an essential service or infrastructure, being an emergency, which requires a significant and co-ordinated response.*
>
> *For the purposes of the definition of emergency, property in the State includes any part of the environment of the State. Accordingly, a reference in the Act to -*
>
> *a) threats or danger to property includes a reference to threats or danger to the environment, and*
>
> *b) the protection of property includes a reference to the protection of the environment.”*

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2.2.2 The Four Phases of an Emergency

Both the SERM Act and the NSW Coastal Management Manual (OEH, 2018a) identify four distinct stages of an emergency – prevention, preparation, response, and recovery (Figure 2-1).

Council's ability to undertake the actions identified in this subplan will be dependent on the availability of resources during emergency events. The actions prescribed must not conflict with or impede the actions of the NSW SES or the other agencies with roles and responsibilities listed in Section 5 of this document. All actions must not put personnel, staff or volunteers in danger. Emergency management works must not be undertaken during extreme weather unless environmental conditions permit works to be undertaken safely.



Figure 2-1 Stages of Emergency Planning

2.3 Coastal Emergencies Covered by the CZEAS

2.3.1 Legislative Requirements

The scope of this CZEAS is dictated by the requirements of the CM Act and the SERM Act.

SERM Act 1989

The SERM Act established the overarching framework for emergency management in NSW. The SERM Act outlines roles and responsibilities for all emergency management in the state, and specifies:

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

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

The NSW SES is the designated combat agency for management of floods, tsunami, and storms, including severe storms which cause coastal erosion. The NSW SES prepares the State Storm Plan, State Flood Plan and State Tsunami Plan, which are subplans to the NSW State EMPLAN 2018.

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CM Act 2016

The CM Act identifies specific emergency management considerations associated with beach erosion, coastal inundation, and cliff instability. Section 15 (3) of the CM Act states that:

> *"A **coastal zone emergency action subplan** is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of **beach erosion**, **coastal inundation** or **cliff instability**, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event"*

Mandatory requirements for a CMP, including the preparation of a CZEAS where required, are identified in Part A of the NSW Coastal Management Manual (OEH, 2018a).

When preparing a CZEAS, it is crucial to consider the relationship between the coastal management framework established by the CM Act, and the broader NSW emergency management framework. This relationship is depicted in Figure 2-2. To this end, Section 15 (4) of the CM Act states that:

> *"A coastal management program **must not** include the following—*
>
> *(a) matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies"*

The purpose of this clause is to ensure that is no duplication or ambiguity of emergency response planning, and to ensure that the CZEAS is consistent with the emergency management provisions addressed in the stage, regional and local EMPLANs, and state and local flood plans (Figure 2-2).

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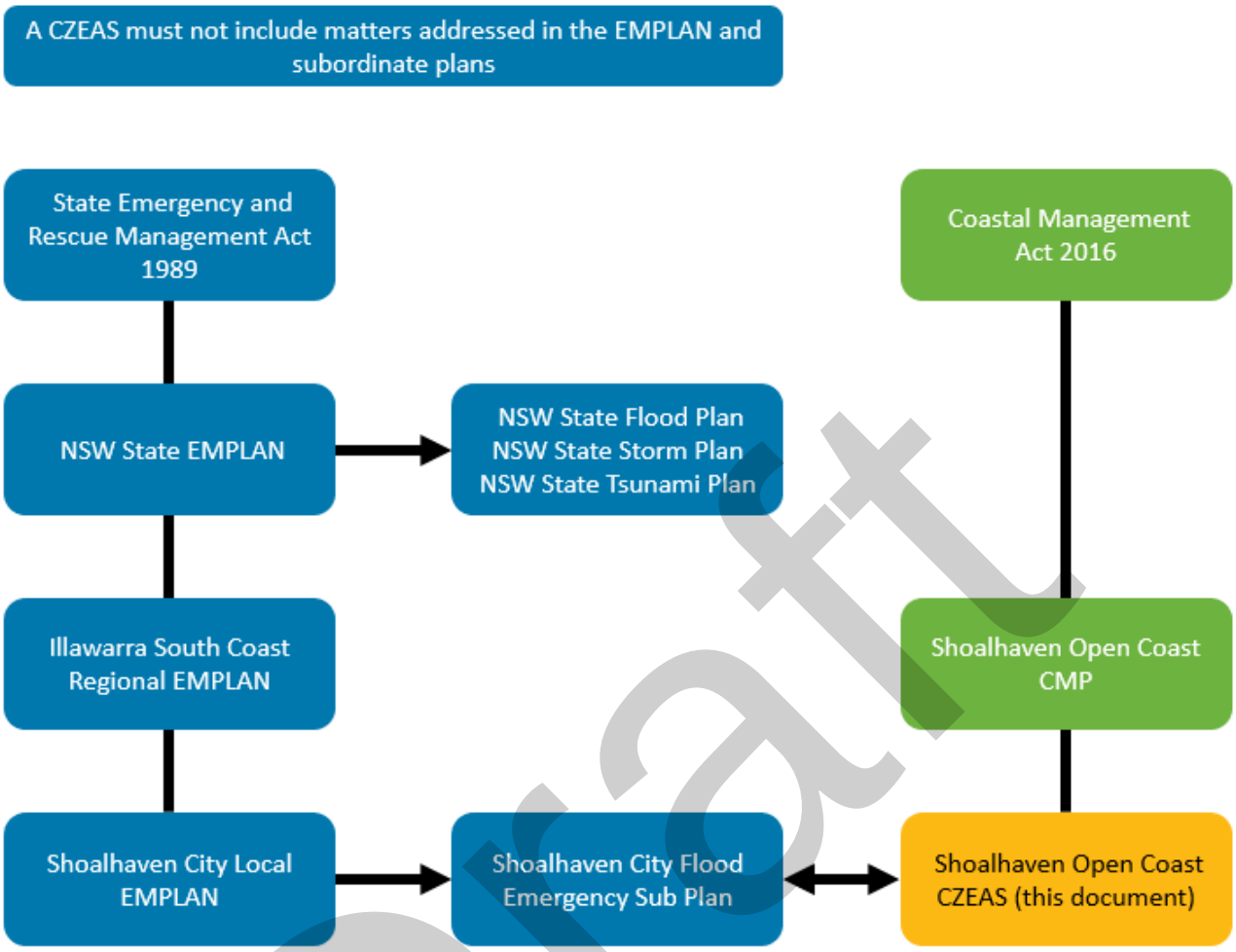

Figure 2-2 Simplified legislative framework for emergency management in NSW and its relationship with coastal management legislation and coastal management programs

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2.3.2 Relationship of the CZAES to other Emergency Plans

As noted in Figure 2-2, the requirements of the CM Act stipulate that this CZEAS must not cover emergencies that are already dealt with by another plan made under the SERM Act.

NSW State Storm Plan

The NSW State Storm Plan (NSW SES, 2023) is a sub plan to the NSW State EMPLAN (see Figure 2-2), and is a comprehensive strategy to effectively prepare for and respond to severe storms across NSW. Section 1.4.3 of the plan states that:

> *"Coastal erosion caused by storm activity is within the scope of this plan. Emergency management of coastal erosion that is not caused by storm activity will be controlled and coordinated by the Local Emergency Operations Controller (LEOCON)".*

Coastal erosion is therefore within the scope of the NSW State Storm Plan. However, in doing so, the Plan identifies the triggers and instances for when local councils need to activate their CZEAS at a local level. It is in this way that these two emergency planning documents dovetail, without overlapping.

Section 1.4.4 of the State Storm Plan (NSW SES, 2023) states that the arrangements for the emergency management of flooding are dealt with in the New South Wales State Flood Emergency Sub Plan (NSW SES, 2021) – described below.

NSW Flood Plan

The NSW Flood Plan (NSW SES, 2021) is a sub plan to the NSW State EMPLAN (see Figure 2-2), and sets out the state level multi-agency arrangements for the emergency management of flooding in NSW. Section 1.4.2 of the NSW Flood Plan defines "flooding" as:

> "*a relatively high-water level which overtops the natural or artificial banks in any part of a stream, river,* ***estuary****, lake, or dam, and/or local overland flooding associated with drainage before entering a watercourse,* ***and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences***".

Subsequently, at a strategic level, the emergency management arrangements for prevention, preparation, response, and initial recovery for still water level coastal inundation is covered by the NSW Flood Plan. At a more regional, level this issue is addressed by the Shoalhaven City Flood Emergency Sub Plan (NSW SES, 2014) – described below.

Shoalhaven City Flood Emergency Sub Plan

The Shoalhaven City Flood Emergency Sub Plan (NSW SES, 2014) is a sub plan of the Shoalhaven Local EMPLAN 2021 (Shoalhaven City Council, 2021) – see Figure 2-2, but specifically covers the local preparedness measures, the conduct of response operations, and the coordination of immediate recovery measures from flooding within the entirety of the Shoalhaven LGA.

The Plan therefore covers still water level coastal inundation across open coast and in estuarine settings of the LGA. The additional arrangements required for open coast wave run-up hazards are therefore covered as part of this CZEAS.

Table 2-1 Planning hierarchy for coastal hazards across the study area

Coastal Hazard	Strategic Arrangements	Local Operations
Coastal erosion	The NSW State Storm Plan (NSW SES, 2023)	This CZEAS
Coastal inundation – still water level flooding	The NSW State Flood Plan (NSW SES, 2021)	The Shoalhaven City Flood Emergency Sub Plan (NSW SES, 2014)
Coastal inundation – open coast wave run-up	The NSW State Flood Plan (NSW SES, 2021)	This CZEAS
Coastal cliff and slope instability	The NSW State Storm Plan (NSW SES, 2023)	This CZEAS

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3 TRIGGERS FOR EMERGENCY ACTION

3.1 Overview

For the purposes of this CZEAS, a coastal emergency event within the Shoalhaven LGA is occurring when one or more of the below triggers occurs:

- The following hazard forecasts are issued:
  - When the Bureau of Meteorology (BoM) has issued the release of a Severe Weather Warning that applies to any of the locations at risk identified in Section 4. More detail regarding these warnings is provided in Section 3.2.
    - The Australian Beach Erosion and Coastal Flooding Early Warning System – while currently an experimental pilot project - may also provide an additional source of information for Council to consider in the context of BoM severe weather warnings.
- The following Impact forecasts and assessment are made:
  - In addition to the BoM Severe Weather Warning, there are location-specific triggers for when coastal hazards will activate the Response Phase. These triggers are discussed in Section 3.3, and are further detailed for each Local Area Plan in Appendix A.
    - A framework for impact forecast for coastal hazard risk is also provided in Section 3.3.2.

In identifying triggers for erosion protection works (such as beach scraping), a balance needed to be found between predicted storm erosion and inundation in large events, and avoiding the triggers being reached too often, resulting in “false alarms” and implementation of emergency coastal protection works unnecessarily often.

3.2 Hazard Forecasts

3.2.1 BoM Severe Weather Warnings

The actions contained in this CZEAS are triggered by the release of a **Severe Weather Warning from the BoM**.

The BoM issues Severe Weather Warnings whenever severe weather is occurring in an area or is expected to develop or move into an area. The warnings describe the area under threat and the expected hazards. Warnings are issued with varying lead-times, depending on the weather situation, and range from just an hour or two to 24 hours or sometimes more.

The BoM specifies the following thresholds for issuing warnings for severe weather warnings[1]:

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

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

[1] http://www.bom.gov.au/weather-services/severe-weather-knowledge-centre/WarningsInformation_SW_SWW.shtml

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Since 2022, additional coastal warnings for tides and surf have been issued separately from other Severe Weather Warnings. This includes the following:

- **Severe Weather Warning for Damaging or Dangerous Surf**: When the waves are expected to be powerful enough to cause damage to property or significant erosion to beaches[2].
- **A Severe Weather Warning for Abnormally High Tides:** Which are likely to cause localised coastal flooding.

NSW weather warnings are issued by the BoM and can be found at the following link: http://www.bom.gov.au/nsw/warnings/. Alternatively, the BoM weather App can show only the weather warnings that apply to the area set by the user.

3.2.2 The Australian Beach Erosion and Coastal Flooding Early Warning System

The Australian Beach Erosion and Coastal Flooding Early Warning System (EWS) is a pilot project funded by the Australian Research Council with collaboration and additional support from Project Partners: Australian Bureau of Meteorology; NSW Department of Planning and Environment; WA Department of Transport; Northern Beaches Council, City of Mandurah, and the United States Geological Survey.

The EWS operates simultaneously at two spatial scales:

- a regional scale (~100km length of coastline) over which the type and intensity of coastal storm hazard(s) are predicted every 100 m alongshore; and
- a local “hotspot” scale (e.g., a specific site) at which a range of quantitative indicators of open-coast erosion and flooding are predicted (Turner, 2020).

On a rolling 7-day forecast horizon, marine wave and water level forecasts are provided by the Australian Bureau of Meteorology (BoM). Wind-wave forecasts are generated using the AUSWAVE model, which is then enhanced using a refined nearshore mesh specific for each region and hotspot. Storm surge forecasts are produced using BoM’s National Storm Surge (NSS) system. Regional-scale beach erosion and coastal flooding hazard forecasts, with a 100 m alongshore resolution, are determined using a “Storm Hazard Matrix” (Leaman, et al., 2021).

It should be noted that at the time of publication of this CZEAS, this system is currently an experimental pilot project - and should not be relied on for operational decision making. However, it can provide an additional source of information for Council to consider in the context of BoM severe weather warnings.

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[2] http://www.bom.gov.au/marine/about/hazardous-surf-messages.shtml

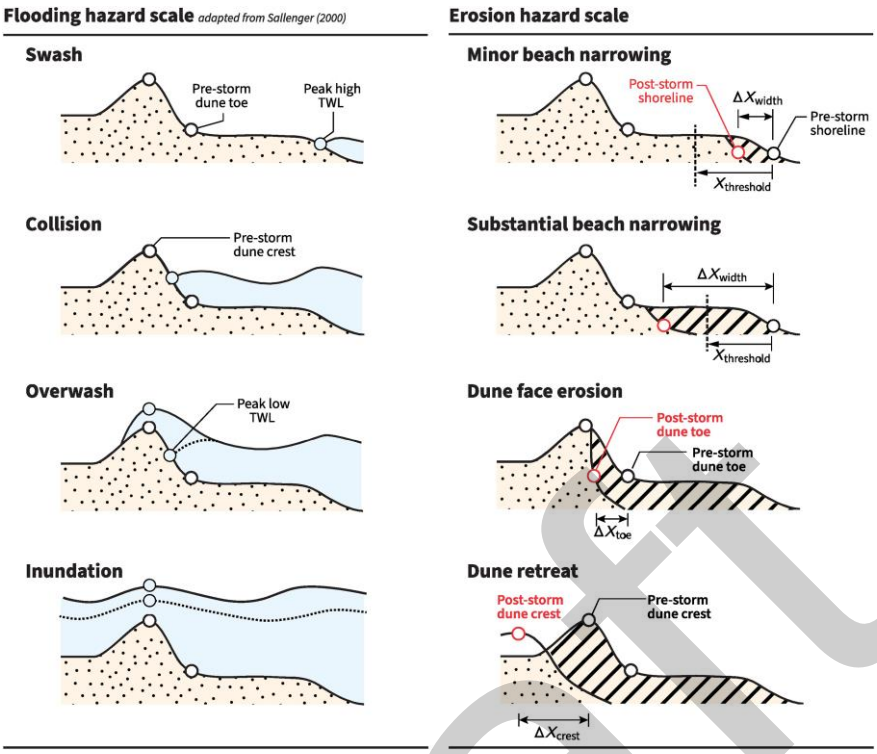

Figure 3-1 Coastal flooding (left) and beach erosion (right) hazard scales (Leaman, et al., 2021)

3.3 Local Impact Triggers and Forecasts

3.3.1 Location Based Triggers

In addition to the Severe Weather Warning, location-specific triggers for when coastal hazards will activate the Response Phase of this CZEAS include when:

- *Coastal erosion* is occurring or expected to occur at key locations at risk of beach erosion identified in Section 4, impacting or with potential to impact on public or private assets and/or affect safe access/egress.
- *Wave run-up* is occurring or expected to occur at the key locations at risk of coastal inundation identified in Section 4, affecting/with potential to affect safe access/egress or impacting/with potential to impact on public or private assets.
- A situation in which *instability of coastal cliffs and slopes* is imminent, occurring or has occurred, and the threat of landslide endangers, or threatens to endanger, the safety or health of people or destroys or damages, or threatens to destroy or damage any sites and assets, as identified in Section 4. With regards to coastal cliffs and slopes, an emergency situation is most likely to arise due to periods of heavy and/or prolonged rainfall.
  - Monitoring heavy and prolonged rainfall is suggested against the following (JK Geotechnics, 2016):
    - Heavy Rainfall: at least 100 mm of rainfall over a 24-hour period; and
    - Prolonged Rainfall: at least 150mm of rainfall over a 72-hour period day period.
  - In monitoring the potential for instability and/or landslide, signs of impending slope instability include (DPIE, 2019):

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

- It should also be noted that in rare circumstances, coastal cliffs and slopes can experience instability events such as landslips that are triggered by seismic activity, including earthquakes.

In practice, expert engineering judgement would need to be applied at times of storms to assess when to initiate particular actions as required. This approach relies on regular monitoring of environmental conditions and cliff, slope, and beach behaviour – and seeking appropriate advice when required.

3.3.2 Impact Forecast of Coastal Hazard Risk

Whilst the actions contained in this CZEAS are triggered by BoM Severe Weather Warnings and location based triggers, it is also important to monitor coastal environmental conditions at a local level - in order to supplement and inform decision making.

This is particularly important as there are a number of possible scenarios described below under which coastal erosion may occur without a severe weather warning being issued. These include:

- Heavy swell - Swell formed at a distance from the coast may result in damaging surf producing large scale erosion and/or inundation – even in the absence of a local severe weather event. Long-range swell may erode the dune system resulting in landward recession of the erosion escarpment.
- Depleted beach profile - Following beach erosion events the local beach profile may be depleted to the extent that even a relatively low or moderate swell coinciding with a high tide may erode the dune system resulting in landward recession of the erosion escarpment.

Therefore, it is necessary for Council to monitor additional sources of forecasting and intelligence information to assist in its preparedness for a coastal emergency event (this may also increase the early warning lead time window beyond the notice provided by BoM warnings). Forecasts and real-time data regarding various coastal hazard parameters (such as wave conditions, tide level, and beach state) can provide information on coastal inundation and erosion along coastlines several days in advance of an impending hazard events, potentially providing a “window of opportunity” to implement a range of emergency responses (Matheen & Nashwan, 2022).

Forecasting coastal erosion and inundation is a complex and challenging task due to the fact that it is not solely governed by a single factor, rather an intricate interplay of several variables, including:

- The astronomical tide cycle, and potential magnitude and timing of storm surge.
- Offshore wave height and direction, and the complex nearshore wave transformation processes that will impacts on wave conditions in the nearshore.
- The beach state prior to the onset of the storm. Beaches undergo continuous cyclic evolution in the form of erosion and accretion, and the beach profile at any given instant has an effect on the impact of subsequent storms.

Subsequently, as part of an early warning process, Council should actively monitor forecasts and real-time information related to ocean waves and tides, using the available data sources provided in Table 3-1. Council

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can also actively monitor the state of their beaches using the tools and data sources provided in Table 3-1, noting that no forecasts are available for beach erosion, and these datasets are limited in their ability to provide real-time (or even near-real time) information.

Table 3-1 Available Sources of data for coastal hazard parameters

Parameter	Forecast Source	Forecast Window	Real-time Information
Wave Height	BoM Interactive Weather and Wave Forecast[3].	7 days	MHL NSW Ocean Wave Data Collection Program[4].
	The NSW Nearshore Wave Forecast[5]	5 days	
Ocean Tide	MHL NSW Tide Charts[6]	1 year	MHL NSW Ocean Tide Data Collection Program[7]
	BoM New South Wales Tide Tables[8]	1 year	
Parameter	**Historical Data Availability**		**Data Type**
Beach State	Shoalhaven City Council Beach Monitoring and Inspections		Photographs, Beach surveys
	CoastSnap (at available beaches)		Photographs
	NSW Beach Profile Database		Beach profiles

These data sources can provide a first-pass indication of when beaches may be at risk of coastal erosion and inundation. Using these sources of information, in particular tide and wave forecasts/predictions, a risk framework has been provided in Table 3-2, which indicates potential levels of coastal erosion and inundation risk.

The framework adopts:

- Thresholds for offshore significant wave height (Hs) height based on historical wave statistics for Port Kembla and Batemans Bay (Shand, et al., 2011) equivalent to:
  - Extreme Wave Conditions: Hs exceeding a 1-year ARI condition of Hs = 5.0 m
  - Moderate Waves: Hs below a 1-year ARI condition of Hs = 5.0 m, but exceeding the 10% exceedance threshold of Hs = 2.5 m.
  - Modal Wave Conditions: Hs below the 10% exceedance threshold of Hs = 2.5 m
- A threshold for elevated water levels of mean high water springs (MHWS), based on the tidal planes at nearby tide gauges such as Crookhaven heads, Jervis Bay, and Ulladulla (OEH, 2012), which is approximately +0.7 m AHD.

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[3] http://www.bom.gov.au/australia/charts/viewer/index.shtml
[4] https://mhl.nsw.gov.au/Data-Wave
[5] https://forecast.waves.nsw.gov.au/
[6] https://mhl.nsw.gov.au/TideCharts
[7] https://mhl.nsw.gov.au/Data-OceanTide
[8] http://www.bom.gov.au/oceanography/projects/ntc/tide_tables.shtml

Table 3-2 Early Warning Parameters for Coastal Erosion and Inundation Impacts

Parameter	Forecast Hs		
	Hs > 5.0 m (> 1-yr ARI)	**Hs = 2.5 to 5.0m** (10% exceedance to 1-yr ARI)	**Hs < 2.5m** (<10% exceedance)
Predicted Tide > MHWS (+0.7 m AHD)	High Risk	Moderate Risk	Low Risk
Predicted Tide < MHWS (+0.7 m AHD)	High to Moderate Risk	Low Risk	Low Risk
Risk Levels			
High	▪ Coastal erosion and inundation risk is high. ▪ Check forecast wave direction to help assess if any particular beaches (or specific beach locations within a beach compartment) may be more severely impacted.		
Moderate	▪ Coastal erosion and inundation risk is moderate. ▪ **However, the risk from storm clustering may be high if a beach (or part of a beach) is already in a moderately eroded condition.** Check pre-storm beach condition beach using data sources in Table 3-1. ▪ Check forecast wave direction to help assess if any particular beaches (or specific beach locations within a beach compartment) may be more severely impacted.		
Low	▪ Coastal erosion and inundation risk is lower. ▪ **However, the risk from storm clustering may be high if a beach (or part of a beach) is already in a severely eroded condition.** Check pre-storm beach condition beach using data sources in Table 3-1. ▪ Check forecast wave direction to help assess if any particular beaches (or specific beach locations within a beach compartment) may be more severely impacted.		

Once the risk of erosion is determined, the risk of damage to infrastructure across the study area should be assessed. Firstly, it should be determined what assets are at risk, as per Table 4-1. If assets are at risk, it would be necessary to (Advisian, 2018b):

- Evaluate the effectiveness of protective works located seaward, which would require knowledge of toe levels, crest levels, and size of the structural elements in the works (such as rock size where applicable).
- Have knowledge of the foundation conditions of the structure (in particular whether the development was founded on deep piles).
- Have undertaken geotechnical investigations in areas known to have a non-sandy subsurface.

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4 AREAS AT RISK

4.1 Overview

This CZEAS only applies to the known locations affected by beach erosion, coastal inundation or cliff and slope instability as noted in this section.

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

4.2 Coastal Erosion and Inundation

The immediate coastal hazard areas are those areas which may be exposed to the coastal hazards of beach erosion and inundation in the event of a coastal emergency. At-risk assets and infrastructure have been identified using the *Immediate Hazard Line* mapping from Council's adopted coastal hazard mapping dataset (Advisian, 2016). The areas that are identified at immediate risk of storm erosion or inundation are indicated in Table 4-1 below.

It should be noted that this hazard mapping is not available for all of Council's managed beaches across the LGA. Subsequently, potentially at-risk assets have been identified for each Council-managed beach location for which hazard mapping was not available through a conservative, proximity-based approach. These beaches are marked with an asterisk (*) in Table 4-1.

Particular notice attention should be given to at-risk critical infrastructure – which is defined in the CM Act as infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rail, roads, gas, sewerage systems, water supply systems or stormwater management systems, airports, ports shipping and harbours. The NSW Coastal Design Guidelines (DPE, 2023) indicates that decision makers should prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency.

Table 4-1 Areas that may be subject to immediate coastal hazard risk

Location (listed North to South)	At-Risk Assets and Infrastructure	Inundation Risk	Erosion Risk
All beaches in the LGA	Council managed public beach access tracks	✓	✓
	Dune vegetation and fencing	✓	✓
Shoalhaven Heads	Shoalhaven Heads SLSC (protected by a rock revetment) and associated infrastructure		✓
	Viewing platforms, picnic tables and minor infrastructure	✓	✓
	7 Council-managed beach access tracks	✓	✓
Culburra Beach	Stormwater outlet at Allerton Avenue	✓	✓
	Public carpark at northern end of beach		✓
	Part of 7 private lots at the southern end of the beach along Penguins Head Road	✓	
	19 Council-managed beach access tracks	✓	✓
Warrain Beach	10 Council-managed beach access tracks	✓	✓
Currarong Beach	Wastewater infrastructure on seaward side of Beecroft Parade	✓	✓

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Location (listed North to South)	At-Risk Assets and Infrastructure	Inundation Risk	Erosion Risk
	Playground in vicinity of boat ramp	✓	✓
	Parts of Warrain Crescent		✓
	Part of 20 private lots along Beecroft Parade subject to reduced foundation capacity and inundation on their seaward side	✓	✓
	5 Council-managed beach access tracks	✓	✓
Callala Bay*	8 Council-managed beach access tracks	✓	✓
	The seaward end of Sheaffe Street	✓	✓
	Sailing Club Building	✓	✓
	Car park area and boat ramp (currently protected by coastal protection works)	✓	
Callala Beach	Parts of 80 private lots	✓	✓
	Up to 53 buildings subject to reduced foundation capacity including Tennis Club		✓
	18 Council-managed beach access tracks	✓	✓
Huskisson Beach	Parts of public cycleway and picnic facilities	✓	✓
	14 Council-managed beach access tracks	✓	✓
Collingwood Beach	Parts of public cycleway and stormwater outlets	✓	✓
	Northern end of Ilfracombe Avenue	✓	
	Parts of 40 private lots south of Montague Street	✓	
	14 Council-managed beach access tracks	✓	✓
Vincentia south - including Orion and, Barfleur Beaches*	9 Council-managed beach access tracks	✓	✓
Nelsons Beach*	5 Council-managed beach access tracks	✓	✓
	Parts of Plantation Point Parade road and car park	✓	✓
Hyams Beach and Little Hyams Beach*	2 Council-managed beach access tracks	✓	✓
	Parts of 16 private lots	✓	✓
	Little Hyams Beach access road and car park	✓	✓
	Little Hyams Beach boat ramp	✓	✓
Cudmirrah Beach*	2 Council-managed beach access tracks	✓	✓
Berrara Beach*	3 Council-managed beach access tracks	✓	✓
Bendalong Boat Harbour	Manta Ray Road along beach frontage	✓	✓
	Playground and public carpark at western end of the beach	✓	✓
	Picnic area and public carpark at eastern boat ramp	✓	✓
	1 Council-managed beach access track	✓	✓
Inyadda Beach and Manyana Beach*	8 Council-managed beach access tracks	✓	✓
Narrawallee Beach	Public reserve and amenities	✓	
	11 Council-managed beach access tracks	✓	✓

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Location (listed North to South)	At-Risk Assets and Infrastructure	Inundation Risk	Erosion Risk
	Wastewater infrastructure (pump station) at southern end of the beach	✓	✓
Mollymook Beach	Golf Club (currently protected by coastal protection works)	✓	
	Sewerage infrastructure including mains and pump station at southern end of beach	✓	✓
	Golf Avenue/Ocean Street	✓	✓
	Parts of Mitchell Parade north of Donlan Road	✓	✓
	Stormwater outlets along Mitchell Parade	✓	✓
	Wastewater infrastructure along Mitchell Parade	✓	✓
	Wastewater pump station and amenities at Beach Road	✓	✓
	12 Council-managed beach access tracks	✓	✓
Collers Beach	Wastewater infrastructure	✓	✓
	Parts of 2 private lots on Shipton Crescent	✓	✓
Ulladulla Harbour*	2 Council-managed beach access tracks	✓	✓
	Princes Highway (currently protected by coastal protection works)	✓	✓
Rennies Beach*	5 Council-managed beach access tracks	✓	✓
Burrill Beach*	7 Council-managed beach access tracks	✓	✓
Wairo Beach*	6 Council-managed beach access tracks	✓	✓
Bawley Cormorant & Gannet Beaches*	14 Council-managed beach access tracks	✓	✓
Racecourse Beach*	2 Council-managed beach access tracks	✓	✓
Shelly Beach*	2 Council-managed beach access tracks	✓	✓
Kioloa Beach*	2 Council-managed beach access tracks	✓	✓
	Scerri Drive (currently protected by coastal protection works)	✓	✓
	Marine Rescue Building (currently protected by coastal protection works)	✓	✓

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4.3 Coastal Cliff and Slope Instability

During Stage 2 of the Open Coast and Jervis Bay CMP, a Geotechnical Cliff and Slope Instability Assessment was undertaken (Douglas Partners, 2023). This study was completed in 2023, and was built upon several prior studies that investigated cliff and slope instability across the Shoalhaven coastal zone (SMEC, 2009 and Advisian, 2016).A number of sites were considered as risk areas for instability and landslides along the coastline of Shoalhaven LGA – and this CZEAS is relevant to those areas.

An overview of risk areas and potential assets is provided in Figure 4-1 and Table 4-2, as adapted from the Stage 2 Geotechnical Cliff and Slope Instability Assessment (Douglas Partners, 2023).

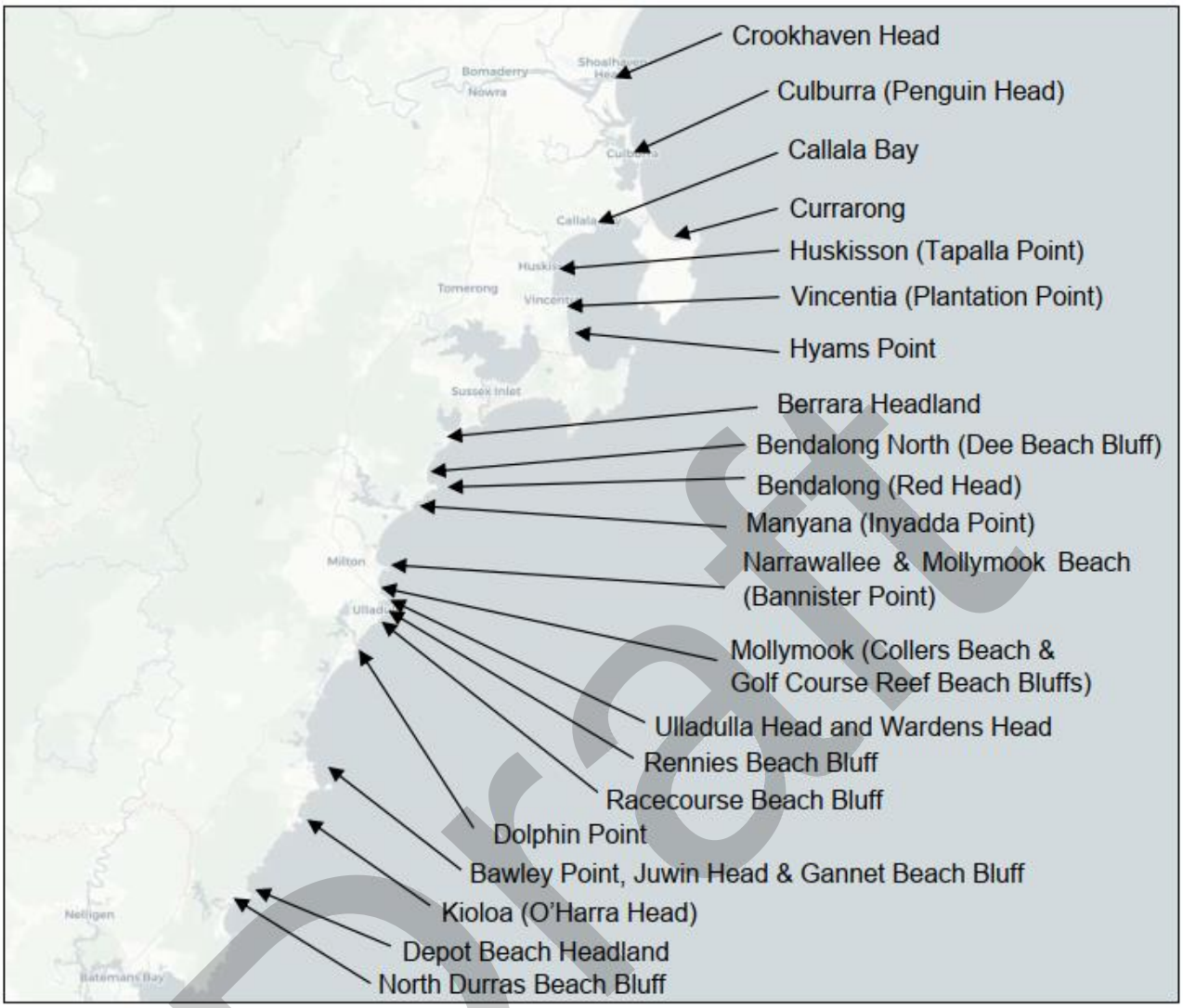

Figure 4-1 Areas affected by Coastal Cliff and Slope Instability (Douglas Partners, 2023)

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Table 4-2 Areas that may be subject to coastal cliff and slope instability risk

Location (N to S)	At Risk Assets		Location (N to S)	At Risk Assets
Crookhaven Heads	Prince Edward Avenue		Bannisters Point	132 private lots
	1 viewing platform			Victor Ave, Surfers Ave, Bannister Head Road, Mitchell Parade, Beach Road
	1 accessway			Wastewater assets along the above roads
Penguin Head (Culburra Beach)	65 private lots			1 viewing platform
	Tilbury Cove amenities block			6 Council-managed beach access tracks
	3 viewing platforms		Mollymook (Collers Beach & Golf Course Reef Beach Bluffs)	22 private lots
	1 accessway			Burleigh Way and car park
Currarong	33 private lots			1 wastewater pump station
	Wastewater infrastructure along Beecroft Parade			1 amenities block
	2 amenities blocks			2 Council-managed beach access tracks
	1 accessway		Ulladulla Head	13 private lots
Callala Bay	23 private lots			Crescent Street, North Street, Shipton Crescent
	Wastewater infrastructure along Boorawine Terrace			Wastewater assets along the above roads
	Marine Drive			3 Council-managed beach access tracks
	Jervis Bay Sailing Club		Wardens Head and Rennies Beach Bluff	26 private lots
	1 amenities block			Wason Street, Did-Dell Street, Parson Street, Rennies Beach,
	10 Council-managed beach access tracks			3 viewing platforms
Huskisson (Tapalla Point)	10 Council-managed beach access tracks			6 Council-managed beach access tracks
	1 viewing platform		Racecourse Beach Bluff	36 private lots
Vincentia (Plantation Point)	12 private lots			Wastewater assets services lots along South Pacific Cres
	Wastewater infrastructure along Twyford St, Vincent St, and Plantation Point Parade			1 carpark
	12 Council-managed beach access tracks			1 accessway
	Vincentia Sailing Club Storage block		Dolphin Point	1 amenities block
Hyams Point and Hyams Beach Area	Access Road and Boat Ramp			1 car park
	1 viewing platform			1 viewing platform
	2 amenities blocks			4 Council-managed beach access tracks
	2 Council-managed beach access tracks		Bawley Point	1 private lot
	Wastewater infrastructure servicing Cyrus Street			Tingira Road
Berrara Headland	26 Private Lots			1 boat ramp and carpark
	Myrniong Grove			3 Council-managed beach access tracks
	5 viewing platforms			
	9 Council-managed beach access tracks			

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Location (N to S)	At Risk Assets		Location (N to S)	At Risk Assets
			Juwin Head & Gannet Beach Bluff	12 private lots
Bendalong North (Dee Beach Bluff)	Holly Street			Malibu Drive
	1 private lot			1 viewing platform
	1 viewing platform			3 Council-managed beach access tracks
	3 Council-managed beach access tracks		Kioloa (O'Harra Head)	1 private lot
Bendalong (Red Head)	Manta Ray Road			Panamuna Place
	2 boat ramps			1 accessway
	1 car park		Depot Beach Headland	Fairly Street
	1 amenities block		North Durras Beach Bluff	3 private lots
	1 accessway			Flinders Road.
Manyana (Inyadda Point)	51 private lots			1 car park and access road
	1 viewing platform			
	2 Council-managed beach access tracks			

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5 ROLES AND RESPONSIBILITIES

The general responsibilities of emergency services organisations and support agencies are listed in the Local and State EMPLANs, such as the NSW State Storm Plan (NSW SES, 2023), NSW State Flood Plan (NSW SES, 2021), and the Shoalhaven City Flood Emergency Sub Plan (NSW SES, 2014). Table 5-1 summarises the roles and responsibilities of these stakeholders that are specifically relevant to this CZEAS.

It should be noted that private landholders are responsible for private land. Private property owners have responsibilities to monitor, manage, prepare and repair their properties for risks associated with coastal erosion, inundation and cliff and slope instability. Any physical works on private property are subject to development controls and environmental planning instruments, including the Shoalhaven Development Control Plan 2014. Private property owners should notify Council immediately of any concerns outside of their property; however, property owners should seek advice directly from suitably qualified geotechnical and/or coastal engineers with regards to instability concerns within their property boundaries. Council does not have a positive obligation to take particular action to protect private property. There is, however, a statutory obligation upon Council to consider any valid development application for coastal protection works which may be lodged by property owners.

Table 5-1 Roles and Responsibilities

Organisation / Personnel	Responsibilities
Shoalhaven City Council	▪ Prepare, maintain, and update this CZEAS (NSW SES, 2023). ▪ Provide the NSW SES with a copy of this CZEAS (NSW SES, 2023). ▪ Assist the NSW SES with community awareness programs to ensure people in locations potentially threatened by coastal erosion, inundation, and cliff/slope instability understand the threat and its management (NSW SES, 2023). ▪ Prevention & Preparation: Implement the Prevention and Preparation Phase emergency actions prior to a coastal emergency event occurring. ▪ Response: In the event of a coastal emergency at a location at risk, activate this CZEAS and implement the Response Phase emergency actions for the duration of the coastal emergency event. ▪ Recovery: Implement the Recovery Phase emergency actions following a coastal emergency event. ▪ Under the CM Act, Council is the designated coastal authority with responsibility for care of public land within its care, control, and management. The carrying out (or authorising and coordinating) of coastal emergency protective works to protect public assets from coastal erosion, inundation, and cliff/slope instability is Council's role, if it chooses to undertake such measures. ▪ Assist the NSW SES with reconnaissance of areas susceptible to coastal erosion and/or inundation, and cliff/slope instability. ▪ Assist, at their request, the Police, NSW SES, and Local Emergency Operations Controller (LEOCON) in dealing with a coastal emergency. ▪ Liaise with the NSW SES Local Controller to provide advice regarding the need for response actions by the NSW SES such as evacuations.
Local Emergency Management Committee (LEMC)	▪ The LEMC is constituted under the SERM Act for each local government area and is responsible for preparing plans for response and recovery from emergencies. ▪ The LEMC is chaired by the Chief Executive Officer or their nominated representative from Shoalhaven City Council (Shoalhaven City Council, 2023). Represented on the LEMC are combat agencies including:

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Organisation / Personnel	Responsibilities
	– Police. – Rural Fire Service. – Fire and Rescue NSW. – State Emergency Services. – Surf Life Saving NSW. – Marine Rescue. ▪ The LEMC will review the Shoalhaven Local EMPLAN every three (3) years, or following any (Shoalhaven City Council, 2021): – activation of the Plan in response to an emergency; – legislative changes affecting the Plan; – exercises conducted to test all or part of the Plan; – In the event of that deficiencies are identified; or – Change of roles and responsibilities.
Local Emergency Operations Controller (LEOCON)	▪ Monitor coastal emergency event operations. ▪ Act as the combat/responsible agency in the event of: – Coastal erosion that is not caused by direct storm activity, as per Section 1.4.3 of the NSW State Storm Plan (NSW SES, 2023); or – Coastal cliff and slope instability (Illawarra South Coast Regional Emergency Management Committee, 2019). ▪ Coordinate support to the NSW SES Shoalhaven City Local Incident Controller, if requested to do so (NSW SES, 2014; Shoalhaven City Council, 2021).
Shoalhaven City Council Local Emergency Management Officer (LEMO)	▪ If requested by the NSW SES Incident Controller, advise appropriate agencies and officers of the start of response operations (NSW SES, 2014). ▪ Provide executive support to the LEMC and LEOCON in accordance with the Shoalhaven Local EMPLAN (Shoalhaven City Council, 2021).
NSW State Emergency Service (NSW SES) Local Unit Members	▪ Act as the combat/responsible agency for damage control and the coordination of community evacuation during the following coastal zone hazards as per the Shoalhaven Local EMPLAN (Shoalhaven City Council, 2021): – Flooding. – Storms. – Tsunamis. ▪ Act as the combat/responsible agency in the event of coastal erosion that is caused by storm activity (NSW SES, 2023). ▪ NSW SES roles and responsibilities in relation to storms and coastal erosion are detailed within the NSW State Storm Plan (NSW SES, 2023), and where relevant the NSW State Flood Plan (NSW SES, 2021). Responsibilities may include: – Assist in the collection of flood and coastal erosion/inundation information for the development of intelligence. – Evacuation. – Delivery of warnings. – Assisting with road closures and traffic control operations. ▪ The NSW SES is not authorised to undertake emergency coastal protection works (NSW SES, 2014) such as placement of rock armour or geotextile sand containers.

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Organisation / Personnel	Responsibilities
	▪ Undertake preparedness education related to its legislated responsibilities of flood, storm, tsunami and earthquake.
NSW SES Local Controller	▪ Deal with floods as per the Shoalhaven City Flood Emergency Sub Plan (NSW SES, 2014). ▪ Identify and monitor people and/or communities at risk of flooding and coastal erosion. ▪ Provide an information service in relation to: – Coastal erosion. – Coastal inundation. – Road conditions and closures (general information only). – Confirmation of evacuation warnings. ▪ Direct the evacuation of people and/or communities. ▪ Ensure caravan parks are advised of flood/coastal inundation warnings. ▪ Coordinate the collection of flood and coastal erosion/inundation information for development of intelligence.
NSW Rural Fire Service (RFS)	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ Identify and notify the NSW SES of any locations at risk of fire or hazardous materials that pose a significant threat to surrounding populations due to the impact of a flood for incorporation into NSW SES flood intelligence and planning. ▪ Conduct HAZMAT operations including asbestos risks, arising from flood and storm emergencies in coordination with the SES Incident Controller. ▪ Assist the NSW SES with the: – Delivery of evacuation warnings and the conduct of evacuations. – Warning and/or evacuation of at-risk communities. – Monitoring/reconnaissance of flood prone areas. ▪ Provide equipment for pumping flood water out of buildings and from low-lying areas. ▪ Assist with clean-up operations, including the hosing of flood affected properties.
Ambulance Service of NSW	▪ The roles and responsibilities for NSW Ambulance are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan (NSW SES, 2021). Roles and responsibilities in addition those include: – Participate in NSW SES briefings, training & exercises as required. – Provide a Liaison Officer to the NSW SES State Command or Incident Control Centre/s as required. – Provide Incident Management Personnel and Liaison Officers to the NSW SES where required.
Australian Government Bureau of Meteorology (BoM)	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ The BoM issue public weather and storm warning products before and during a storm (NSW SES, 2023). These may include: – Severe Thunderstorm Warnings. – Severe Weather Warnings. – Tropical Cyclone Watches. – Tropical Cyclone Warnings.

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Organisation / Personnel	Responsibilities
	– Coastal Strong Wind, Gale Storm and Hurricane Force Warnings. – Flood Watches and Flood Warnings. ▪ Provide weather and flood information directly to the NSW SES, LEMC and relevant agencies (NSW SES, 2021).
Marine Rescue NSW	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ When requested by NSW SES, assist in flood operations when training and equipment are available and suitable including assistance with: – Warning and/or evacuation of at-risk communities. – Providing communications personnel. – Property protection tasks including sandbagging. – Flood rescue operations
NSW Department of Planning and Environment	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ 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. ▪ Provide related advice on coastal hazards to the NSW SES on request.
NSW National Parks and Wildlife Service	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ 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 the 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.
NSW Police Force	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ Provide Incident Management personnel and Liaison Officers to the NSW SES Operation Centre if required. ▪ When requested by NSW SES in storm operations: – Restrict access to areas affected by storms. – Assist with warning and/or evacuation of at-risk communities. – Provide specialist storm damage response teams to assist the NSW SES if available. – Assist with monitoring and reconnaissance of areas potentially damaged by storms. ▪ Coordinate search and rescue operations. ▪ Conduct road and traffic control operations in conjunction with NSW SES, Council and/or TfNSW. ▪ Coordinate security of supply lines for evacuated and damaged areas. ▪ Manage Disaster Victim Registration.

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Organisation / Personnel	Responsibilities
	▪ Operate the Public Information and Inquiry Centre, if requested or otherwise needed during flood events.
Surf Life Saving NSW	▪ Where local arrangements allow, provide support to NSW SES as per agreed arrangements (NSW SES, 2023).
Transport for NSW	Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include: ▪ TfNSW (Maritime), following the direction of the NSW Police Force will assist in the identification and recovery of vessels.

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6 COMMUNICATION PROTOCOLS

6.1 Overview

Council will provide information about anticipated coastal emergency events to impacted communities through the following mechanisms provided in Table 6-1.

Table 6-1 Communication Protocols

Communication	
	▪ 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.
	▪ Provide emergency management information (in the form of signage and brochures) at local community centres. ▪ Inform the community of Council's intended erosion emergency responses under this CZEAS. ▪ Inform community members and businesses about the need to develop a household / business Emergency Management Plan (EMP) for coastal hazards.
	▪ In consultation with the NSW SES and BoM, provide public information about approaching coastal emergencies where possible through digital means. ▪ Provide emergency management briefings to the public as needed, in particular affected landholders, to communicate the strategy outlined in this CZEAS, including coastal emergency event triggers, locations at risk, roles and responsibilities and the emergency response actions, including what actions a landholder may need to take and any assistance that may be available to them. ▪ 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. ▪ See Section 6.2 for more information about message construction.
	▪ Place barriers and signage at Council-managed beach access tracks that are closed due to the impacts of coastal erosion, inundation and/or cliff/slope instability. Refer to the maps in Appendix A for locations of Council-managed beach access tracks.
	▪ Provide up to date information on Council's website regarding Council-managed beach access tracks closures and re-openings.

6.2 Message Construction

6.2.1 The AWS Framework

As per Section 6.1, 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 new national approach to information and warnings during emergencies like bushfire, flood, storm, extreme heat, and severe weather. Up until now there have been different warning systems for different hazard types across Australia. The new Australian Warning

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System aims to provide consistent warnings to Australian communities so that people know what to do when they see a warning level. There are three warning levels, provided in Table 6-2, as per AIDR (2021).

Table 6-2 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.

The Australian Warning System utilises a system of triangular hazard icons with escalating tiers and associated colour palettes. Specific icons have been developed for bushfire, flood, storm, extreme heat, and severe weather, as per Figure 6-1 below. It is recommended that the following icons are used:

- "Storm" icon – for coastal erosion, coastal inundation, and coastal cliff and slope instability that are jointly occurring with storm events.
- "Other" icon – for coastal erosion and coastal cliff and slope instability that does not directly coincide with storm events (as these two hazards may also occur in the aftermath of a specific storm event).

The Australian Warning System utilises a nested model for communications that includes the warning level + hazard / location + action statements – as per Figure 6-1. Each warning level has a set of action statements to give the community clearer advice about what to do. Calls to action can be used flexibly across all three warning levels and contextualised for each hazard for a given location. Table 6-3 provides some examples of the Australian Warning System's "calls to action" input (AIDR, 2021) that may be useful in a coastal emergency.

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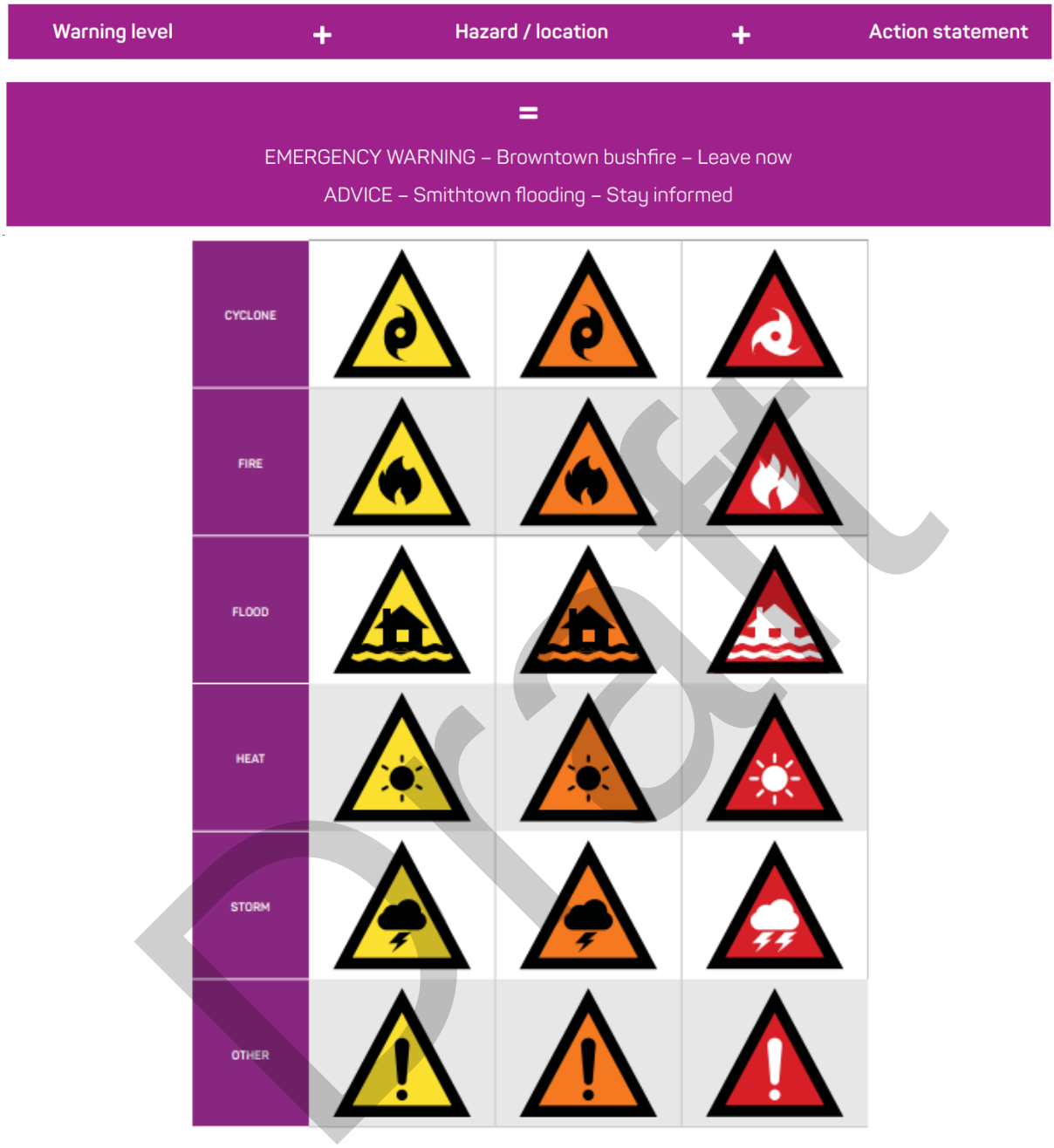

Figure 6-1 Australian Warning System messaging model (top) and hazard icons (AIDR, 2021)

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Table 6-3 Examples of Australian Warning System calls to action (AIDR, 2021) that may be used in a coastal emergency

Advice	Watch and Act	Emergency Warning
▪ Prepare now ▪ Stay informed ▪ Monitor conditions ▪ Stay informed/threat is reduced ▪ Avoid the area ▪ Return with caution	▪ Prepare to leave/evacuate ▪ Leave/evacuate now (if you are not prepared) ▪ Prepare to take shelter ▪ Move/stay indoors ▪ Stay near shelter ▪ Walk two or more streets back ▪ Monitor conditions as they are changing ▪ Move to higher ground (away from creeks/rivers/coast) ▪ Limit time outside ▪ Avoid the area ▪ Stay away from damaged buildings and other hazards ▪ Prepare for isolation ▪ Do not enter flood water ▪ Not safe to return ▪ Prepare your property	▪ Leave/evacuate (immediately, by am/pm/hazard timing) ▪ Seek/take shelter now ▪ Shelter indoors now ▪ Too late/dangerous to leave

6.2.2 Message Communication

According to the Australian Disaster Resilience Handbook (AIDR, 2009):

'the best predictions, the best interpretive material and the best warning messages are of little value if they have no impact on damages or safety. Failure is guaranteed if warning messages based on … predictions and interpretations … are not conveyed effectively to those expected to respond. In essence, a warning which is not communicated effectively is no warning at all if it is not heard or heeded'.

The handbook identifies two different types of message communication based on target audience:

1. General warnings are disseminated ('broadcast') to whole communities or regions.
2. Specific warnings are intended for individuals or parts of communities and reflect the need for 'narrowcasting' to specific audiences who may have specific characteristics or be at different kinds of risk.

A combination of the following warning methods may be utilised:

- Internet – including authorised social media and the official Council website.
- Mobile and fixed public address systems
- Two-way radio
- Emergency Alert
- Telephone/fax
- Doorknocking

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- Variable message signs
- Community notices in identified hubs
- Distribution through established community liaison networks/partnerships

Emergency Alert is a national telephony-based alert system used by emergency service agencies to send voice messages and short message service (SMS) to landline/mobile telephones in times of emergency. Where appropriate and usually in conjunction with other warning messages, Emergency Alert is used to send SMS/voice alerts to landline and mobile telephones in a specified geographic area. The emergency alert system should be used in conjunction with the three levels of emergency waring depicted in Figure 6-1.

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7 EMERGENCY RESPONSE ACTION PLAN

7.1 Overview

This section outlines what actions are to be undertaken in the four phases of emergency management at each of the locations at risk that this CZEAS applies to.

- Section 7.2 summarises the coastal emergency actions through the four phases of emergency management (see Figure 2-1), which apply to the locations at risk along the entire study area.
- Appendix A provides details regarding the location-specific actions to address coastal erosion and coastal inundation for high-risk beaches, along with associated mapping.
- Appendix B provides mapping of coastal cliff and slope areas and an associated monitoring and inspection template.

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

Implementation of the actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document. The implementation of an applicable safety hazard risk assessment is required prior to the undertaking of any intervention or non-intervention management measures.

Emergency protection works must not be undertaken during extreme weather unless tidal variations permit works to be undertaken safely. In addition, actions must not conflict with or impede NSW SES or DPE works.

Actions in this CZEAS aim to reduce risk:

- In areas where Council has chosen not to implement other coastal protection works to reduce coastal hazard risks, which have been evaluated as tolerable or acceptable.
- Where coastal hazard risks persist because an agreed action in this CMP has not yet been implemented.
- In situations where coastal hazard risks persist even after the implementation of other actions, leading to what is termed as residual risk.
- When rare and large or unexpected events occur, outside the design criteria or capacity of agreed management actions in this CMP.

7.2 Study Area Wide Actions

Table 7-1 Coastal Emergency Actions: Phase 1 – Prevention

Action	Description	Responsibility	Timing
1.1	**Inform:** Make this CZEAS available to all relevant stakeholders identified in Section 5.	Council	Ongoing
1.2	**Inform:** Provide advice to the community, landholders, and the NSW SES about the potential for a coastal emergency from beach erosion, coastal inundation or cliff or slope instability – and the types of responses that are and are not permitted.	Council	Ongoing
1.3	**Inform:** Inform the community of Council's intended erosion emergency responses under this CZEAS.	Council	Ongoing

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Action	Description	Responsibility	Timing
1.4	**Review:** Through the Local Emergency Management Committee (LEMC), consult with SES, DPE, Local Police, LEOCON, FRNSW to ensure this CZEAS remains consistent the relevant local, regional, and state-based emergency management plans (see Figure 2-2).	Council	Within 6 months of EMPLAN updates
1.5	**Review:** Review and update this CZEAS in line with any future updates to the CVA Mapping or CMP implementation.	Council NSW SES	Ongoing
1.6	**Review:** Assess threats to life and property arising from a coastal emergency through the CMP process.	Council	During CMP preparation and review.
1.7	**Plan:** Apply development controls to developments in the coastal hazard areas in accordance with the Shoalhaven LEP and DCP.	Council	Ongoing
1.8	**Plan:** Obtain the necessary approvals to allow Nature Assisted Beach Enhancement (NABE) to be carried out in those areas where public infrastructure is at risk. An overview of NABE methods and approaches are provided in Appendix C.	Council	Ongoing
1.9	**Plan:** Develop an early warning system for this CZEAS by formalising the processes set out in Section 3.4 and dovetailing them with Council's internal and external communications protocols and policies.	Council	Ongoing
1.10	**Plan:** Develop protocols between Council and NSW SES and LECON in relation to operational activities for situations where an Emergency Operations Centre (EOC) is not established.	Council	Ongoing
1.11	**Plan:** Establish internal operational protocol and procedures for all coastal hazard scenarios for LEMO, Council's coastal officers and works crews, and communications staff.	Council	Ongoing

Table 7-2 Coastal Emergency Actions: Phase 2 – Preparedness

Action	Description	Responsibility	Timing
"Sunny Day" Preparedness			
2.1	**Inform:** Inform community members and businesses about the need to develop a household / business Emergency Management Plan (EMP) for coastal hazards.	Council	Ongoing
2.2	**Inform:** Inform Council staff about the emergency responses within this plan and ensure relevant personnel have the copies of the plan.	Council	Ongoing
2.3	**Plan:** The LEMC will review the Shoalhaven Local EMPLAN every three (3) years as per Table 5-1 to ensure interoperability preparedness.	LEMC	Ongoing

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Action	Description	Responsibility	Timing
2.4	**Plan:** Prepare an up-to-date list of contact details for key Council staff involved in coordinating actions under the CZEAS (include responsibilities of staff who prepare for, manage and coordinate recovery from an erosion emergency event) and individuals from whom Council may need advice, such as DPE staff, or with whom to integrate from other emergency sectors).	Council	Ongoing
2.5	**Plan:** Prioritise planning and response to maximise (to the greatest extent practical) continued functionality for essential infrastructure during an emergency event.	Council	Ongoing
2.6	**Plan:** Develop an operations procedure to guide Council's response to coastal emergency events (including resourcing, internal training, testing and periodic review).	Council	Ongoing
2.7	**Monitor:** Undertake regular monitoring of coastal conditions, tide, wave height, rainfall, and weather condition forecasts for indication of approaching coastal hazards, as per Table 3-1.	Council	Ongoing
Precaution Preparedness - where of triggers for Response Phase are anticipated			
2.8	**Plan:** Ensure signage to close Council-managed beach access tracks and other public areas, and signage warning pedestrians of coastal hazards risks are available for use during coastal emergencies.	Council	Ongoing
2.9	**Plan:** 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.	Council	Ongoing
2.10	**Monitor:** Monitor events and triggers that will activate the Response Phase. Storm prediction and monitoring, including issuing hazard alerts i.e., Severe Weather Warnings by the BoM.	Council NSW SES	Ongoing

Table 7-3 Coastal Emergency Actions: Phase 3 – Response

A9tion	Description	Responsibility	Timing / Trigger
3.1	**Monitor:** Monitor events and triggers that will activate the Response Phase. Storm prediction and monitoring, including issuing hazard alerts i.e., Severe Weather Warnings by the BoM.	Council NSW SES	Ongoing
3.2	**Plan:** 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).	SEOCON REOCON LEOCON NSW SES	Response phase activated.

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A9tion	Description	Responsibility	Timing / Trigger
3.3	**Plan:** No actions undertaken should impede, conflict, or overlap with those of response agencies under the SERM Act unless there is prior agreement between the relevant parties.	Council	Response phase activated.
3.4	**Communicate:** Implement the communication protocol in conjunction with the combat agency (NSW SES) to advise landholders, residents, public authorities and other organisations that a coastal emergency is likely or is occurring and that actions in this CZEAS are to be implemented. Release media information as necessary to keep the community informed.	Council NSW SES	Response phase activated.
3.5	**Prepare:** Place appropriate equipment on standby (back up radios, signs, and barricades etc.).	Council	Response phase activated.
3.6	**Monitor:** At locations that are impacted – or expected to be impacted - by coastal hazards, undertake monitoring of beach state and coastal hazard conditions on a daily basis (minimum), preferably during high tide. This includes monitoring: ▪ The need for barriers and safety signage to be erected at damaged and potentially dangerous beach access points, to minimise risk to public safety. ▪ The need to remove existing beach signage, bins, beach access infrastructure, and dune fencing where threatened by coastal erosion (and removing these assets where safe to do so to prevent damage or being washed away). ▪ The need to enact other response measures.	Council	Response phase activated. Ony if/when safe to do so.
3.7	**Monitor:** Undertake monitoring of identified coastal cliff and slope instability risk areas on public land.	Council	Response phase activated by rainfall triggers. Ony if/when safe to do so.
3.8	**Close Beach Access:** Close access to potentially affected beaches. Erect barricades and signs, as necessary. Refer to Appendix A for locations of Council-managed beach access tracks.	Council	Act if Council-managed beach access track is unsafe due to: ▪ Damaged access track structure, steps, slats, platforms, posts etc. ▪ Where access terminates at a beach erosion scarp greater than 1 m in height. ▪ Dangerous waves or excessive wave run-up progressing into access tracks.

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A9tion	Description	Responsibility	Timing / Trigger
			▪ Otherwise deemed unsafe.
3.9	**Close Foreshore Access:** Close access to public foreshore reserves, public lookouts, and other public areas. Erect barricades and signs, as necessary. Refer to Appendix A for locations of foreshore areas.	Council	Act if public foreshore reserves areas are unsafe due to: ▪ Coastal erosion resulting in instability or undermining. ▪ Coastal inundation, wave run-up and overtopping likely to cause or likely to cause inundation of areas with public access.
3.10	**Close Roads:** Close affected Council managed roads or liaise with road owners to enable closure. Erect barricades and signs as necessary.	Council	Act if roads or vehicle access tracks are unsafe due to: ▪ Coastal erosion resulting in instability or undermining. ▪ Coastal inundation, wave run-up and overtopping likely to cause or likely to cause inundation of areas.
3.11	**Manage Essential Infrastructure:** Through consultation with utilities providers (such as Shoalhaven Water) assess the requirement and options for utilities management where such infrastructure becomes or is likely to become affected by coastal hazards. Erect barricades and signs, as necessary.	Council	As required.
3.12	**Respond:** Seek specialist coastal engineering advice where required.	Council NSW DPE	As required.
3.13	**Respond:** Seek advice from DPE staff as required.	Council NSW DPE	As required.

Table 7-4 Coastal Emergency Actions: Phase 4 – Recovery

Action	Description	Responsibility	Timing / Trigger
4.1	**Monitor:** Conduct/organise detailed inspections of sites potentially affected by coastal hazards and assess damage to assets and the natural environment. Assess the structural integrity of any damaged infrastructure. Seek professional advice as required.	Council	Following an emergency event. Once it is safe to do so.
4.2	**Close Beach Access:** Access to remain closed until dune regrades naturally and foredune has recovered. Continue temporary safety fencing and associated warning signage as necessary.	Council	Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.

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Action	Description	Responsibility	Timing / Trigger
4.3	**Restore:** Where beach erosion has generated a vertical erosion escarpment of greater than 1 m in height that presents a risk to assets or has created unsafe access, Council will take action to make the area safe. This may include regrading the escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.	Council	Following an emergency event. Once it is safe to do so. Act if foreshore access is unsafe due to: ▪ A vertical erosion escarpment of greater than 1 m in height.
4.4	**Restore:** Arrange for the repair of Council-managed beach access tracks. If the access track cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.	Council	Following an emergency event. Once it is safe to do so Act if Council-managed beach access track is unsafe due to: ▪ Damaged access track structure, steps, slats, platforms, posts etc. ▪ A vertical erosion escarpment of greater than 1 m in height. ▪ Dangerous waves or excessive wave run-up progressing into access tracks. ▪ Otherwise deemed unsafe.
4.5	**Restore:** Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.	Council	Following an emergency event. Once it is safe to do so.
4.6	**Restore:** Removal of beach/storm debris that poses high risk to public safety, in line with Council's Foreshore Reserves Policy (POL12/304) and associated contemporary risk assessment on a site-by-site basis.	Council	Following an emergency event. Once it is safe to do so.
4.7	**Restore:** Restore access to beaches and headlands.	Council	Following an emergency event. Once it is safe to do so.
4.8	**Restore:** Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead – Coastal Management, Environmental Services for approval – and in line with the Local Area Plans for specific beaches set out in Appendix A. An overview of NABE methods and approaches are provided in Appendix C.	Council	Following an emergency event. Once it is safe to do so
4.9	**Monitor:** Investigate any unauthorised coastal works and monitor as necessary.	Council	Response phase activated.

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Action	Description	Responsibility	Timing / Trigger
4.10	**Inform:** Continue to maintain a communication strategy warning of the dangers of any persisting high, unstable, or near-vertical erosion escarpments drying out and collapsing without notice.	Council	Following an emergency event. Once it is safe to do so.
4.11	**Inform:** Liaise with property owners to ensure any private and/or public structures do not pose a risk to the public.	Council	Following an emergency event.
4.12	**Inform:** If necessary, issue orders under the Local Government Act 1993 and/or the Environmental Planning and Assessment Act 1979 when properties are deemed structurally unsafe or pose a risk to the public.	Council	As required.
4.13	**Record:** Record coastal emergency impacts and response actions. Take remedial action where necessary. Maintaining photographic and written records of events and decision-making processes. See Section 7.5.	Council	Following an emergency event. Once it is safe to do so.
4.14	**Inform:** Erect permanent warning signs if necessary.	Council	Following an emergency event.
4.15	**Restore:** Replenish any emergency materials and supplies for use in any future erosion events	Council	Following an emergency event.
4.16	**Review:** Undertake an After Action Review (see section 7.5) review of this CZEAS and update as necessary to improve the future effectiveness of coastal emergency response actions.	Council NSW SES NSW DPE	Within 2 months of plan activation, or as necessary.

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7.3 Local Beach Sub-Plans & Mapping

Appendix A of this document provides a series of Local Area Sub-Plan for local beaches considered to be exposed to high levels of infrastructure or public safety risk due to coastal hazards. These plans provide local beach-level specificity to CZEAS actions, along with associated companion mapping. Those actions should be considered in the context of the broader LGA-wide actions provided in Table 7-1 to Table 7-4 above.

Table 7-5 Local Area Sub-Plans

Northern LGA	Jervis Bay Area	Central and Southern LGA
A.01 - Shoalhaven Heads	A.05 - Callala Bay	A.11 - Bendalong Harbour Beach
A.02 - Culburra Beach	A.06 - Callala Beach	A.12 - Narrawallee Beach
A.03 - Warrain Beach	A.07 - Huskisson Beach	A.13 – Mollymook Beach
A.04 - Currarong Beach	A.08 - Collingwood Beach	A.13 - Collers Beach
	A.09 - Nelsons Beach	A.14 - Ulladulla Harbour Beaches
	A.10 - Hyams Beach	A.15 - Kioloa Beach

7.4 Local Headland Mapping & Inspection Template

Appendix B of this document provides the following:

- A pro-forma inspection and monitoring template for coastal cliffs and slopes, as developed by Douglas Partners (Douglas Partners, 2022). The proforma inspection templates are intended to assist Council to monitor changes at sites and identify areas that may require specialised input (e.g., from a geotechnical consultant or structural engineer). Two inspection pro-forma templates have been prepared and are provided in Appendix B – one template targeting at risk assets, and one template targeting at risk coastal slopes and cliffs (Douglas Partners, 2022).
- Companion mapping of coastal cliffs and slopes across the LGA and associated at risk infrastructure.

7.5 Recording Coastal Emergency Impacts and Emergency Response Actions

After a coastal emergency event, Council is to issue a formal After Action Review in coordination with LEMC partners, in order to record the following details in a database, and to maintain effective emergency actions and understand any changes in coastal conditions over time (DPIE, 2019):

- Details of the emergency event – including any coastal erosion, coastal inundation (and wave run-up), and coastal cliff and slope instability. Details are to include the weather conditions and tide under which they were caused including photographs where possible.
- The location of any assets and infrastructure that were damaged and details of the extent of the damage.
- Details of any emergency coastal protection works undertaken (including NABE), including the cost and the installation date.
- Details of any planned future coastal protection works in the CMP that are not yet undertaken, including the cost and the expected implementation timeframe.
- Details of any survey of the beach levels and other features that may be considered required to provide a greater understanding of the hazard or the event.
- Where possible, community feedback regarding the emergency communication and response efforts.
- Review and update (if required) this CZEAS, in particular the Emergency Action Plan, in consultation with the NSW SES and any other relevant agencies (see Section 5 above).

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8 APPROVALS PATHWAYS

Information on approval pathways for coastal protection works and emergency coastal protection works are set out in the Coastal protection works fact sheet (NSW DPE, 2018). 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.

The NSW coastal management framework requires all proposals for coastal protection works to be considered strategically through the development of a CMP. Public authorities can carry out emergency coastal protection works, as exempt development, where these works are in accordance with a CZEAS (such as this document) prepared by the relevant council and included in a certified CMP – see Figure 8-1.

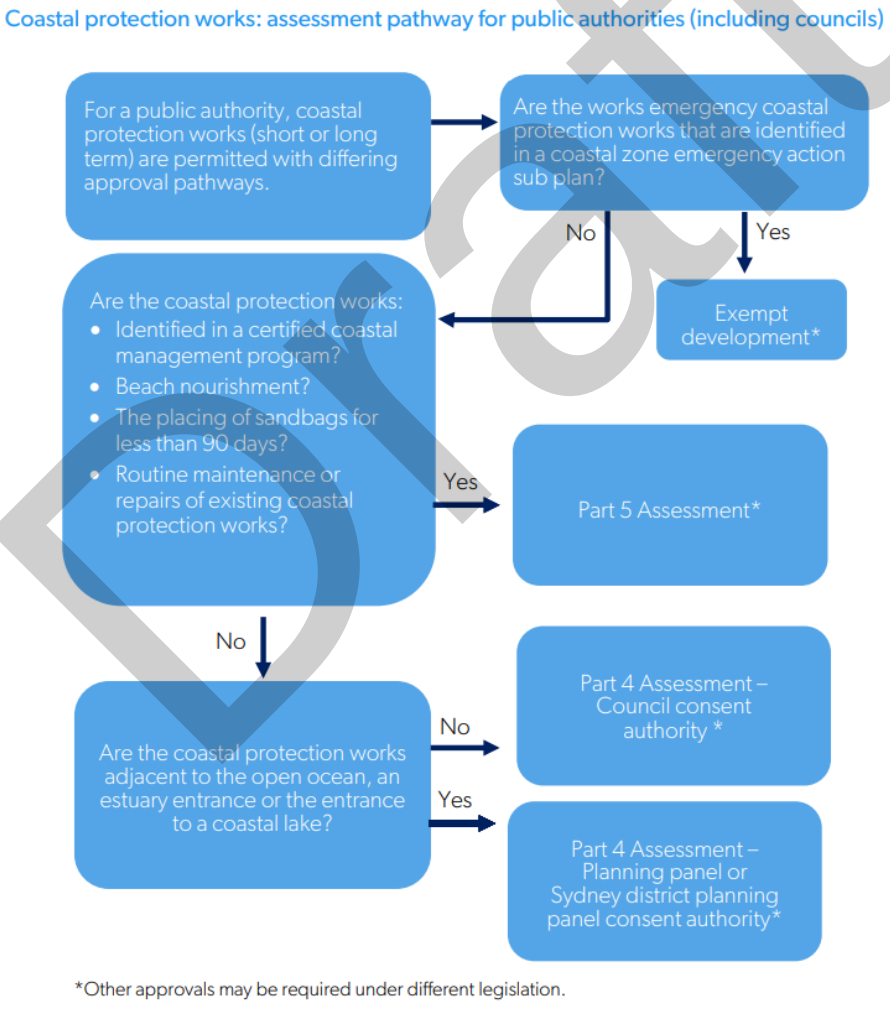

Figure 8-1 Coastal protection works: assessment pathway for public authorities (including councils). Source: DPE.

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APPENDIX A
BEACHES – LOCAL AREA PLANS

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01 - SHOALHAVEN HEADS BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

<table>
<tr><td rowspan="3">Triggers for Action

The following triggers activate the ‘During storm actions’ outlined within this guide:</td><td colspan="3">• The release of the following warnings from BOM that are geographically relevant to the Shoalhaven LGA coastline -http://www.bom.gov.au/nsw/warnings/

○ “Severe Weather Warning for Damaging Surf”
○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
<tr><td colspan="3">• Subject Matter Expert advice applied to assess when to initiate actions as required, which relies on regular monitoring of environmental conditions and beach behavior.</td></tr>
<tr><td colspan="3">• A flood event which initiates the Shoalhaven River entrance flood management protocol can also potentially provide an additional trigger, to be determined by SCC Senior Floodplain Engineer.</td></tr>
<tr><td rowspan="2">Stakeholders and contacts
(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
<tr><td>City Services
City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Crown land
Jerrinja LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Shoalhaven Heads
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Shoalhaven Heads SLSC (protected by an engineered rock revetment)</td><td colspan="2">• Erosion risk
• Reduced foundation capacity</td><td>High</td></tr>
<tr><td>Viewing platform, picnic tables and minor assets</td><td colspan="2">• Erosion risk
• Reduced foundation capacity
Inundation risk</td><td>Moderate-High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Monitor flood events which trigger the Shoalhaven River entrance flood management protocol. • Discuss and prepare response and recovery actions with relevant stakeholders.

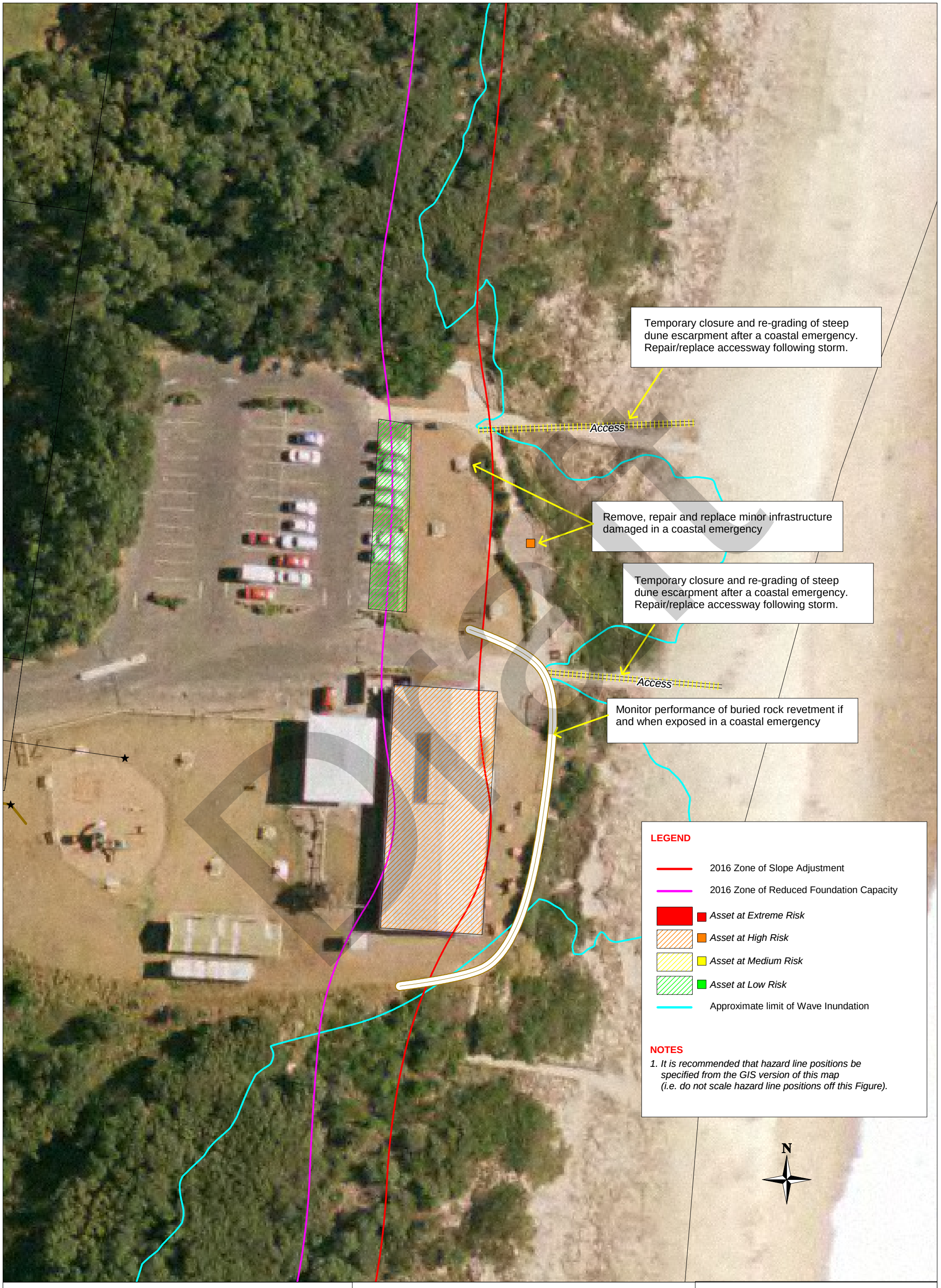
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Monitor the rock protection works at the Surf Club. Seek professional coastal or geotechnical engineering advice where infrastructure is believed to be at risk. Advice should also be sought from DPE, and/or external expertise where appropriate.
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Monitor the rock protection works at the Surf Club. Seek engineering advice when required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register. Due to the number of accessways in this area, consider the permanent closure of the two most southern accessways (refer to maps on the following pages) if deemed unsafe following a storm event.
	  • Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	  • Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	  • Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	  • Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



DATE 13/05/18

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metres

COORDINATE SYSTEM
MGA Zone 56

PROJECT NO.
301015-03933

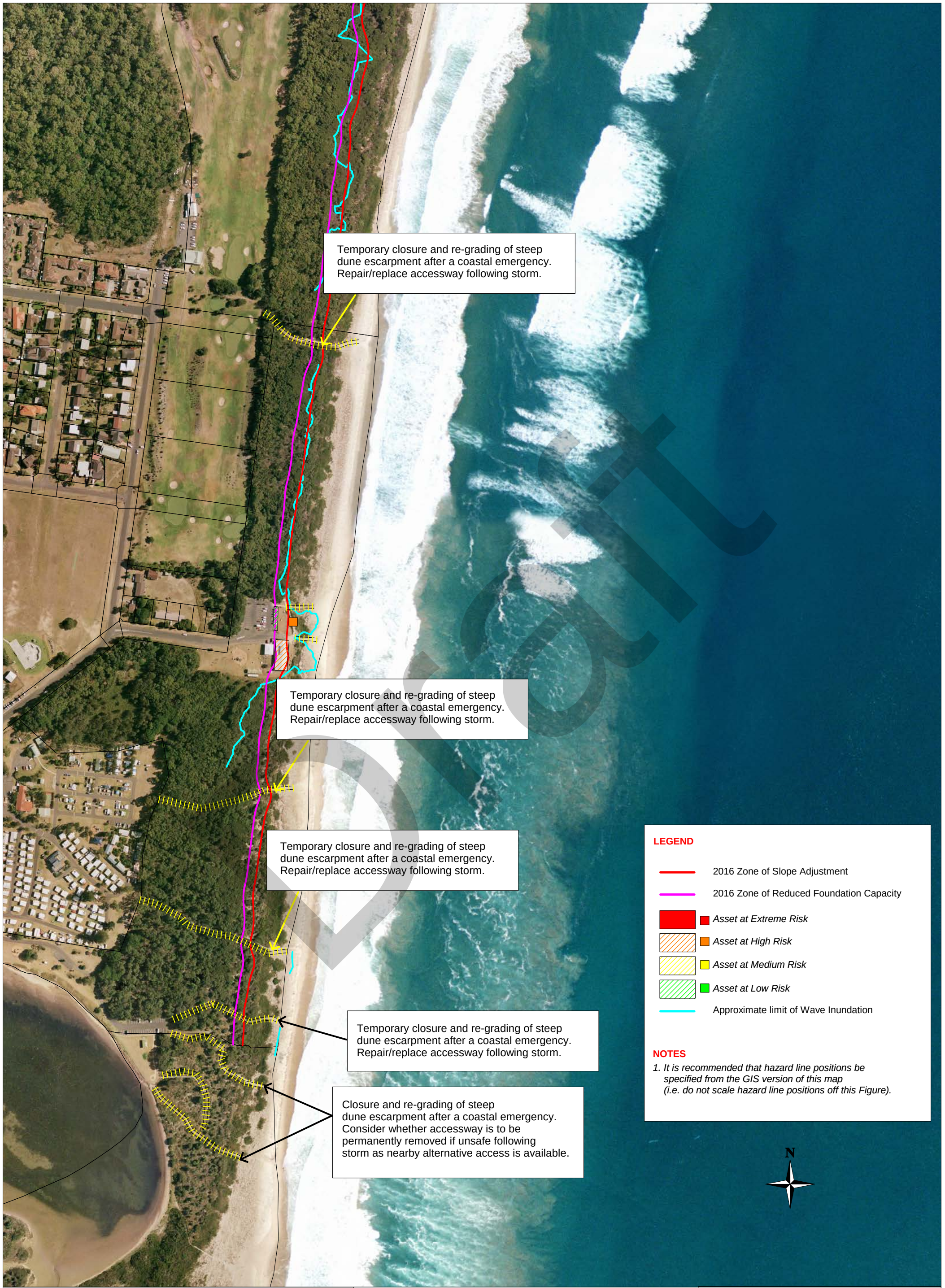
PROJECT TITLE
Shoalhaven Coastal Risk Mapping

FIGURE TITLE Shoalhaven Heads 2016 Risk Map SLSC Local Area Emergency Action Subplan

CREATED BY
C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group



DATE 27/04/18

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COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Shoalhaven Heads 2016 Risk Map showing Beach Access locations and local area Emergency Actions

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

02 - CULBURRA BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

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○ “Severe Weather Warning for Damaging Surf”
○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
<tr><td colspan="3">• Subject Matter Expert advice applied to assess when to initiate actions as required, which relies on regular monitoring of environmental conditions and beach behavior.</td></tr>
<tr><td rowspan="2">Stakeholders and contacts
(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
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Crown land
Jerrinja LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact SCC Coastal Coordinator or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Culburra Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Stormwater outlet at Allerton Avenue</td><td colspan="2">• Erosion risk
• Reduced foundation capacity</td><td>Low</td></tr>
<tr><td>Public carpark at northern end of beach</td><td colspan="2">• Erosion risk
• Reduced foundation capacity</td><td>Moderate</td></tr>
<tr><td>Seaward ends of 7 private lots subject to inundation, exacerbated by presence of private beach accessways providing a pathway for wave runup flows</td><td colspan="2">• Inundation risk</td><td>High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Provide education material to local beachfront owners that have control over the dune area to reduce the impact of private accessways onto the beach and information on what to do in an emergency. • Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

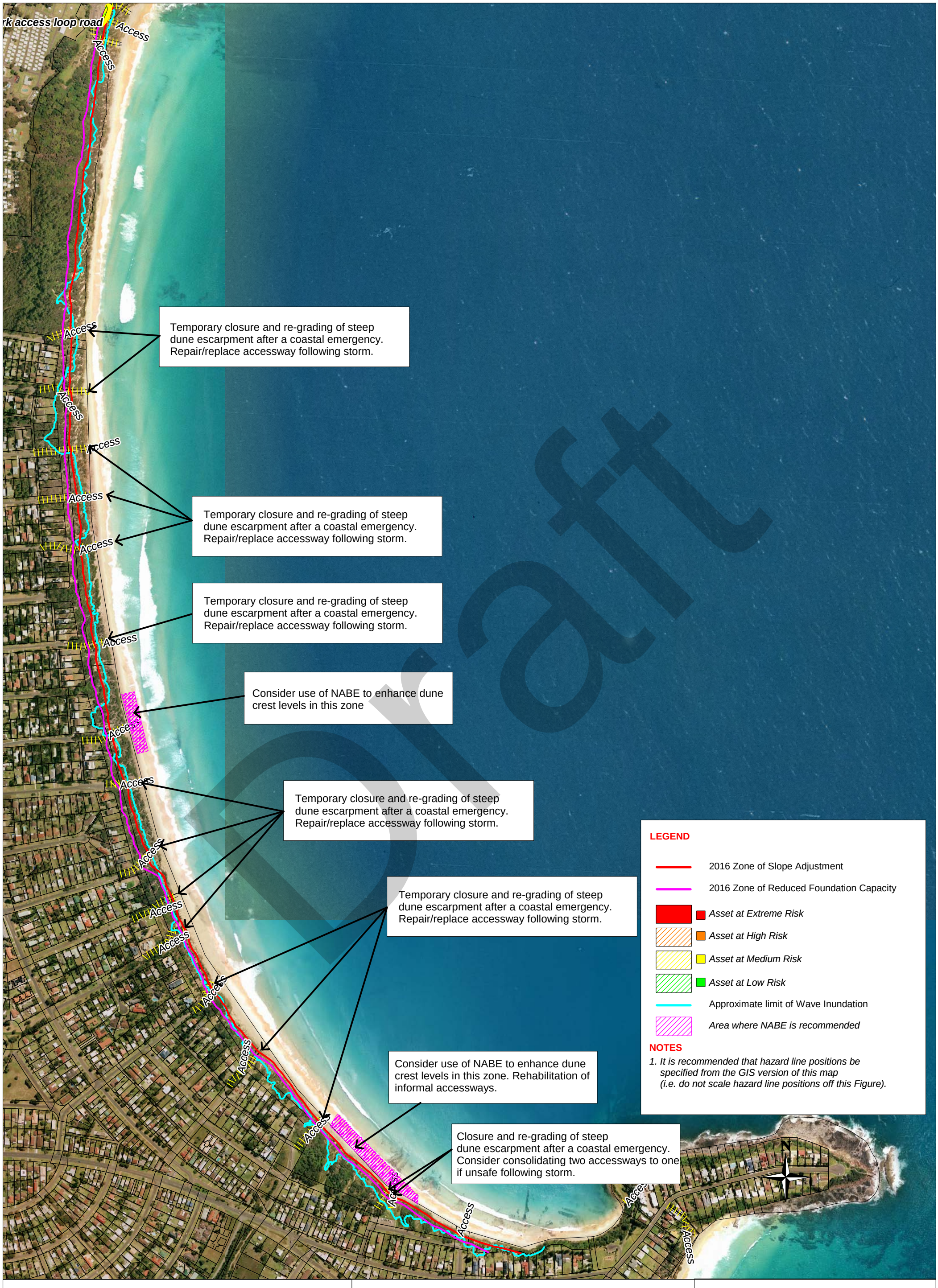
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Monitor the stormwater outlet at Allerton Avenue for excessive scour generation and provide energy dissipation works if necessary.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Temporary closure and repair of northern carpark and loop road access if damaged in a coastal emergency. Repair/replace following storm.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



DATE 27/04/18

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COORDINATE SYSTEM
MGA Zone 56

PROJECT NO.
301015-03933

PROJECT TITLE
Shoalhaven Coastal Risk Mapping

FIGURE TITLE
Culburra 2016 Risk Map showing Beach Access locations and local area Emergency Actions

CREATED BY
C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group

Access

Temporary closure and repair of carpark and loop road access if damaged in a coastal emergency. Repair/replace following storm.

Carpark access loop road

Closure and re-grading of steep dune escarpment after a coastal emergency. Consider whether accessway is to be permanently removed if unsafe following storm as nearby alternative access is available.

Access

Access

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

LEGEND

- 2016 Zone of Slope Adjustment
- 2016 Zone of Reduced Foundation Capacity
- *Asset at Extreme Risk*
- *Asset at High Risk*
- *Asset at Medium Risk*
- *Asset at Low Risk*
- Approximate limit of Wave Inundation

NOTES

1. *It is recommended that hazard line positions be specified from the GIS version of this map (i.e. do not scale hazard line positions off this Figure).*

N

DATE 27/04/18

0 25 50
metres

COORDINATE SYSTEM
MGA Zone 56

PROJECT NO.
301015-03933

PROJECT TITLE
Shoalhaven Coastal Risk Mapping

FIGURE TITLE
Culburra 2016 Risk Map (North)
Local Emergency Action Subplan

CREATED BY
C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group

draft

03 - WARRAIN BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

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Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

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CCBs - list</td></tr>
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• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Warrain Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>No assets identified in being in immediate coastal hazard risk (excluding beach accessways). The city-wide actions apply here</td><td colspan="2">• N/A</td><td>N/A</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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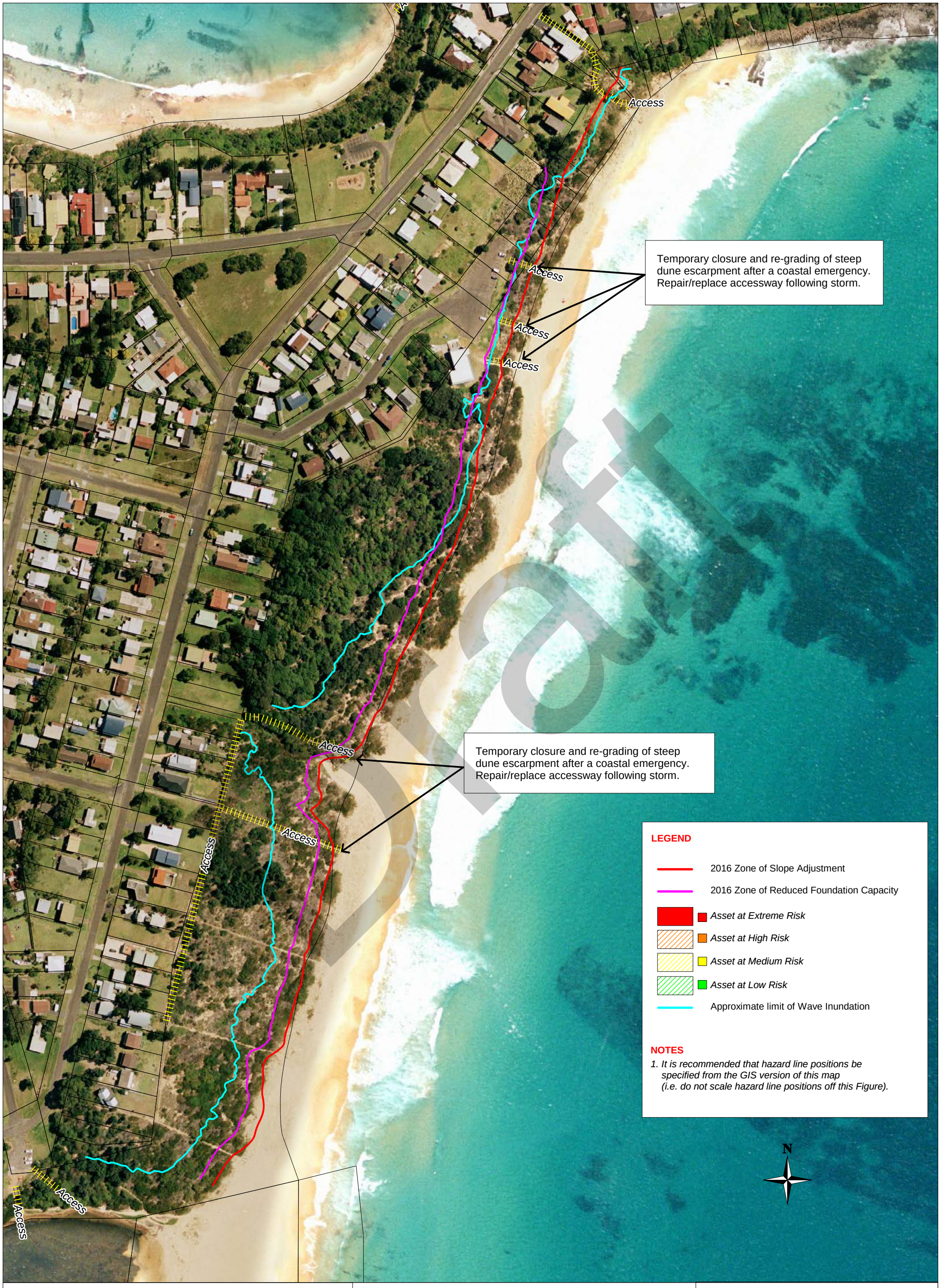

Draft

DATE 27/04/18

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Warrain 2016 Risk Map
Local Area Emergency Action Plan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group

04 - CURRARONG BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

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Jerrinja LALC
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Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Currarong Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Wastewater infrastructure on seaward side of lots at Beecroft Parade</td><td colspan="2">• Erosion risk
• Reduced foundation capacity
• Inundation risk</td><td>High</td></tr>
<tr><td>Playground in vicinity of boat ramp</td><td colspan="2">• Erosion risk
• Reduced foundation capacity
• Inundation risk</td><td>Moderate</td></tr>
<tr><td>Parts of Warrain Crescent</td><td colspan="2">• Reduced foundation capacity</td><td>High</td></tr>
<tr><td>Part of 20 private lots along Beecroft Parade subject to reduced foundation capacity and inundation on their seaward side</td><td colspan="2">• Reduced foundation capacity
• Inundation risk</td><td>High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders. • Monitor the exposure of Warrain Crescent to erosion and/or inundation and implement temporary road closure if needed.

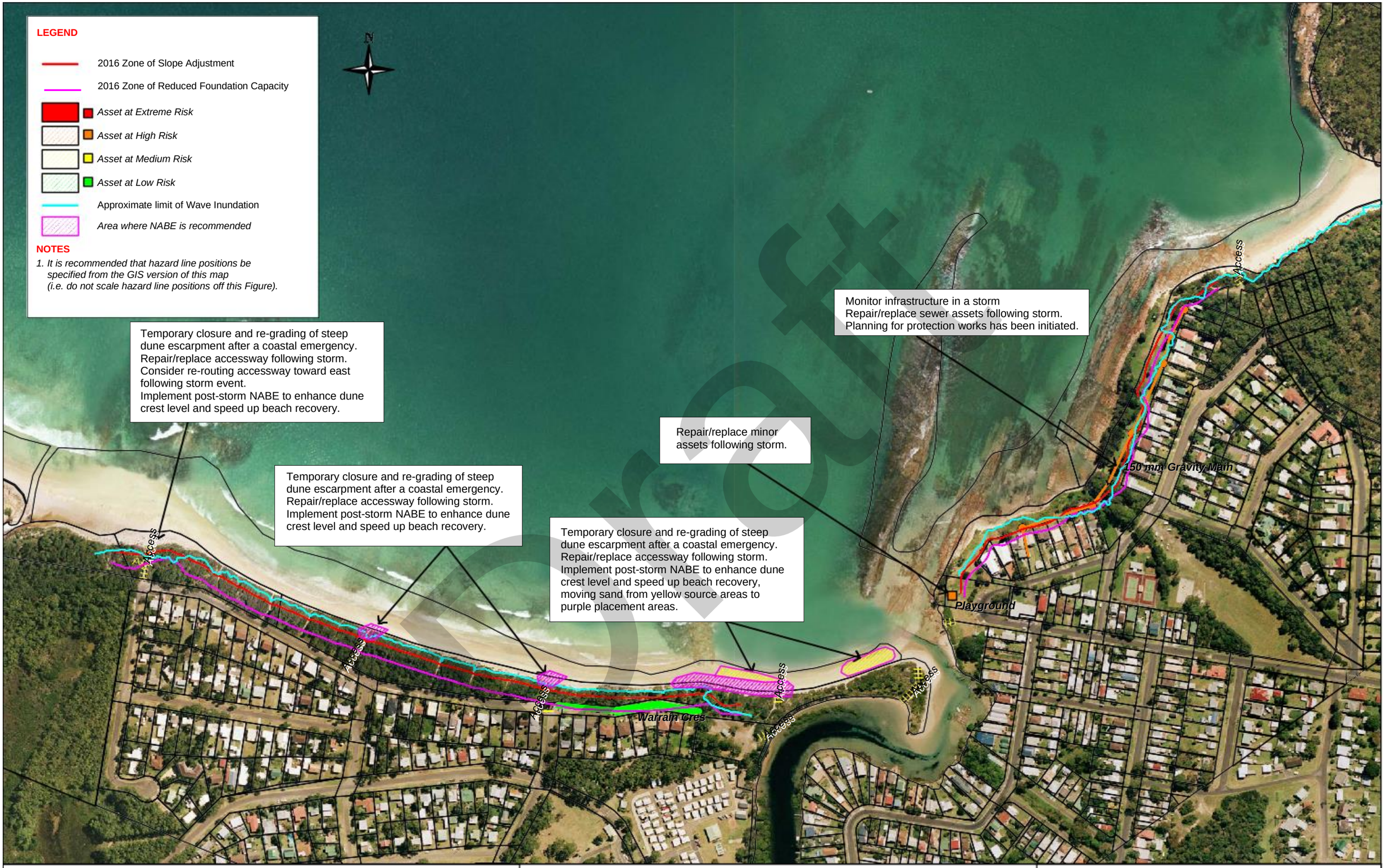
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.
	  • Monitor Infrastructure along Beecroft Pde.

After (immediate)	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Monitor, repair and replace infrastructure that may be damaged in a storm event including sewerage infrastructure and the playground near Beecroft Parade. Temporarily isolate/take out of service the sewer pipe if necessary to prevent environmental damage caused by rupture of the sewer mains.
	• Monitor the exposure of Warrain Crescent to erosion and/or inundation and implement temporary road closure if needed.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Undertake NABE to assist post-storm recovery for the beach accessways at Peel Street and the eastern end of Warrain Crescent.
	• Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



DATE	27/4/18	0 50 100 metres	COORDINATE SYSTEM	MGA Zone 56	FIGURE TITLE: Currarong 2016 Risk Map and Local Area Emergency Action Plan
PROJECT NO.	301015-03933	PROJECT TITLE	Shoalhaven Coastal Mapping		CREATED BY: C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

05 - CALLALA BAY

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
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(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
<tr><td>City Services
City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Marine Parks
Crown land
Jerrinja LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Callala Bay
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Car park area and boat ramp (currently protected by coastal protection works)</td><td colspan="2">• Inundation risk</td><td>Low</td></tr>
<tr><td>Sailing Club Building</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Extreme</td></tr>
<tr><td>The seaward end of Sheaffe Street</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Moderate</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

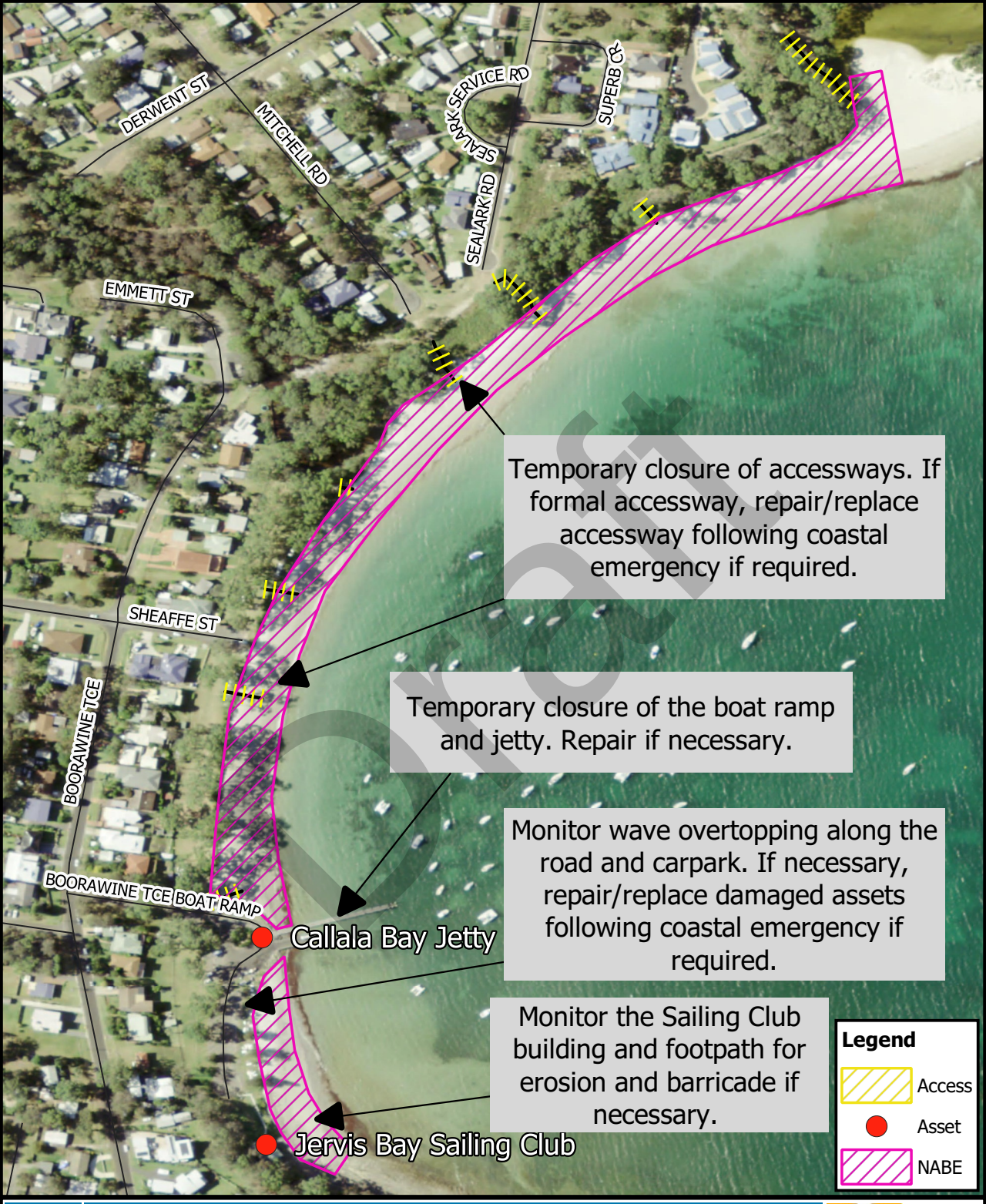
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Temporary closure and repair of Sheaffe Street if damaged in a coastal emergency. Repair/replace following storm.
	• Temporary closure of boat ramp, jetty and carpark if affected by coastal inundation and determined unsafe for public use.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Monitor the rock protection works at the car park and boat ramp – Seek engineering advice when required.
	• Monitor the Sailing Club building for potential signs of undermining. Seek professional coastal or geotechnical engineering advice where infrastructure is believed to be at risk. Advice should also be sought from DPE, and/or external expertise where appropriate.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



0 50 100 m

Job Name: Shoalhaven Open Coast CMP - CZEAS

Callala Bay 2023 Emergency Action Reference Guide Map

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06 - CALLALA BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

<table>
<tr><td rowspan="2">Triggers for Action

The following triggers activate the ‘During storm actions’ outlined within this guide:</td><td colspan="3">• The release of the following warnings from BOM that are geographically relevant to the Shoalhaven LGA coastline -http://www.bom.gov.au/nsw/warnings/

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• Environmental management plans
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<tr><td colspan="4">At Risk Assets – Callala Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Parts of 80 private lots</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity</td><td>High</td></tr>
<tr><td>16 private dwellings on Quay Road</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity</td><td>Extreme</td></tr>
<tr><td>Up to 53 buildings subject to reduced foundation capacity including Tennis Club</td><td colspan="2">• Reduced Foundation Capacity</td><td>Extreme</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• Monitor the beach and frontal dune along Quay Road to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Monitor the beach and frontal dune along Quay Road to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate.
	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along public beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft

LEGEND

- 2016 Zone of Slope Adjustment
- 2016 Zone of Reduced Foundation Capacity
- *Asset at Extreme Risk*
- *Asset at High Risk*
- *Asset at Medium Risk*
- *Asset at Low Risk*
- Approximate limit of Wave Inundation
- *Area where NABE is recommended*

NOTES

1. *It is recommended that hazard line positions be specified from the GIS version of this map (i.e. do not scale hazard line positions off this Figure).*

Provide community education materials on caring for the dunes

Use post-storm NABE to aid recovery of dune

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm. Consider consolidating two accessways to a single accessway.

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

Use post-storm NABE to aid recovery of dune

Carpark

Access

Access

Access

Access

Tennis Club

N

DATE 27/4/18	0 25 50 metres	**COORDINATE SYSTEM** MGA Zone 56	**FIGURE TITLE** Callala 2016 Risk Map Emergency Action Subplan
PROJECT NO. 301015-03933		**PROJECT TITLE** Shoalhaven Coastal Mapping	**CREATED BY** C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

Draft

LEGEND

- 2016 Zone of Slope Adjustment
- 2016 Zone of Reduced Foundation Capacity
- *Asset at Extreme Risk*
- *Asset at High Risk*
- *Asset at Medium Risk*
- *Asset at Low Risk*
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Carpark

Carpark

Access

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

Consider removing accessways following storm as sufficient alternative access is available in these areas

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

Consider removing accessways following storm as sufficient alternative access is available in these areas

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm. Repair/replace damaged minor assets if required.

Monitor area at Quay Road frontage during/after a storm. If there is imminent threat to infrastructure apply for permit from Jervis Bay Marine Park Authority to undertake NABE as a post-storm recovery management action for entire frontage.

Temporary closure and re-grading of steep dune escarpment after a coastal emergency. Repair/replace accessway following storm.

N

0 50 100 metres

DATE	27/4/18	**COORDINATE SYSTEM**	MGA Zone 56
PROJECT NO.	301015-03933	**PROJECT TITLE**	Shoalhaven Coastal Mapping
FIGURE TITLE	Callala 2016 Risk Map - Beach Accessways Emergency Action Subplan		
CREATED BY	C. Adamantidis		

Shoalhaven City Council

Advisian WorleyParsons Group

07 - HUSSKISSON BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

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• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Huskisson Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Parts of public cycleway and picnic facilities</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

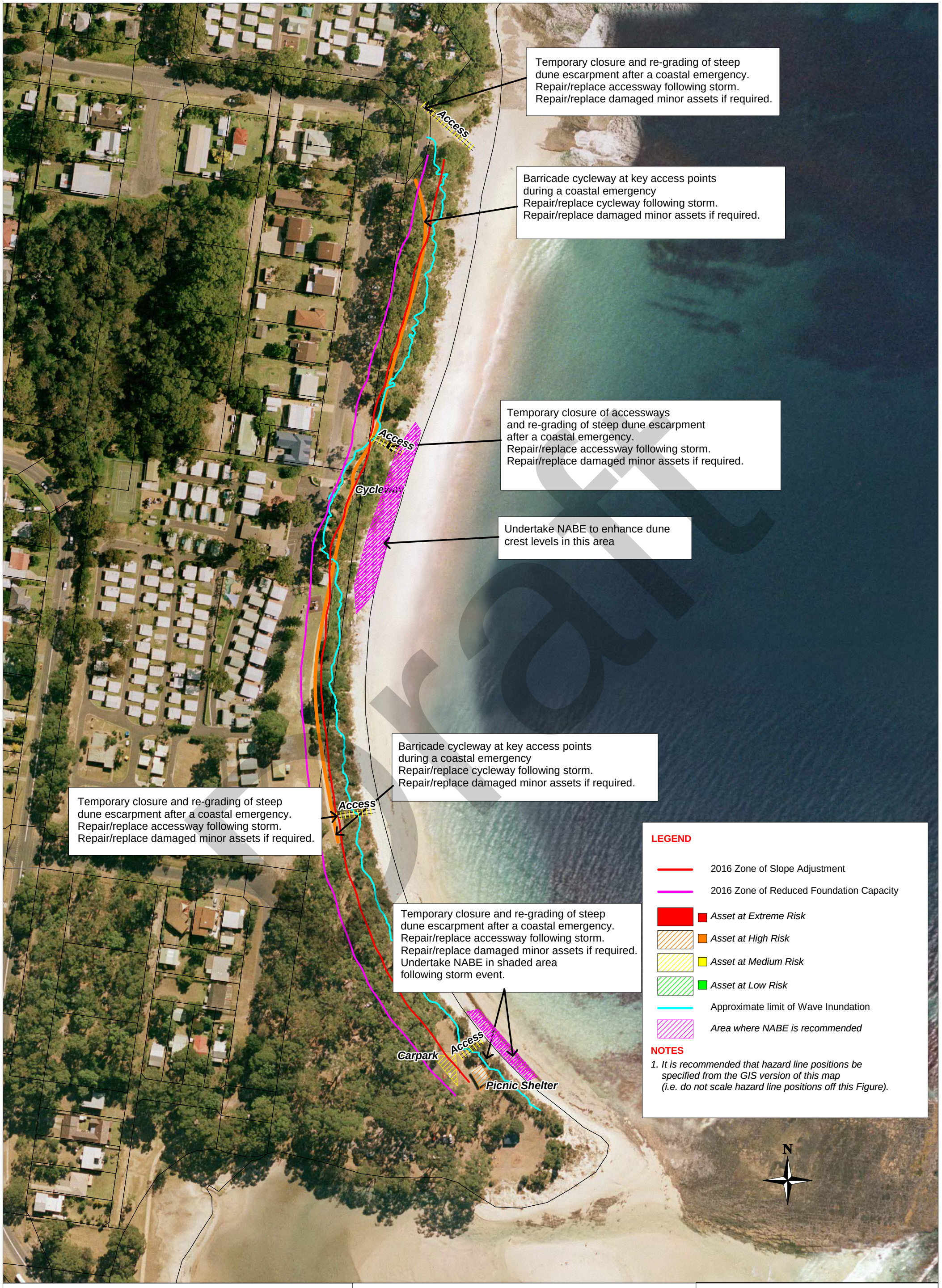
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the public cycleway and picnic facilities. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along public beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

DRAFT



DATE 27/04/18

0 25 50
metres

COORDINATE SYSTEM
MGA Zone 56

PROJECT NO.
301015-03933

PROJECT TITLE
Shoalhaven Coastal Risk Mapping

FIGURE TITLE
Huskisson 2016 Risk Map
Local Emergency Action Plan

CREATED BY
C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group

Draft

08 - COLLINGWOOD BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

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Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

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<tr><td colspan="4">At-Risk Assets – Collingwood Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Parts of public cycleway and stormwater outlets</td><td colspan="2">• Erosion risk
• Inundation risk
• Reduced foundation capacity</td><td>High</td></tr>
<tr><td>Northern end of Ilfracombe Avenue</td><td colspan="2">• Inundation risk</td><td>High</td></tr>
<tr><td>Wastewater infrastructure</td><td colspan="2">• Inundation risk</td><td>Moderate</td></tr>
<tr><td>Seaward end of lots at Montague Street, Susan Street and Elizabeth Drive south of Susan Street.</td><td colspan="2">• Inundation risk</td><td>Moderate</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

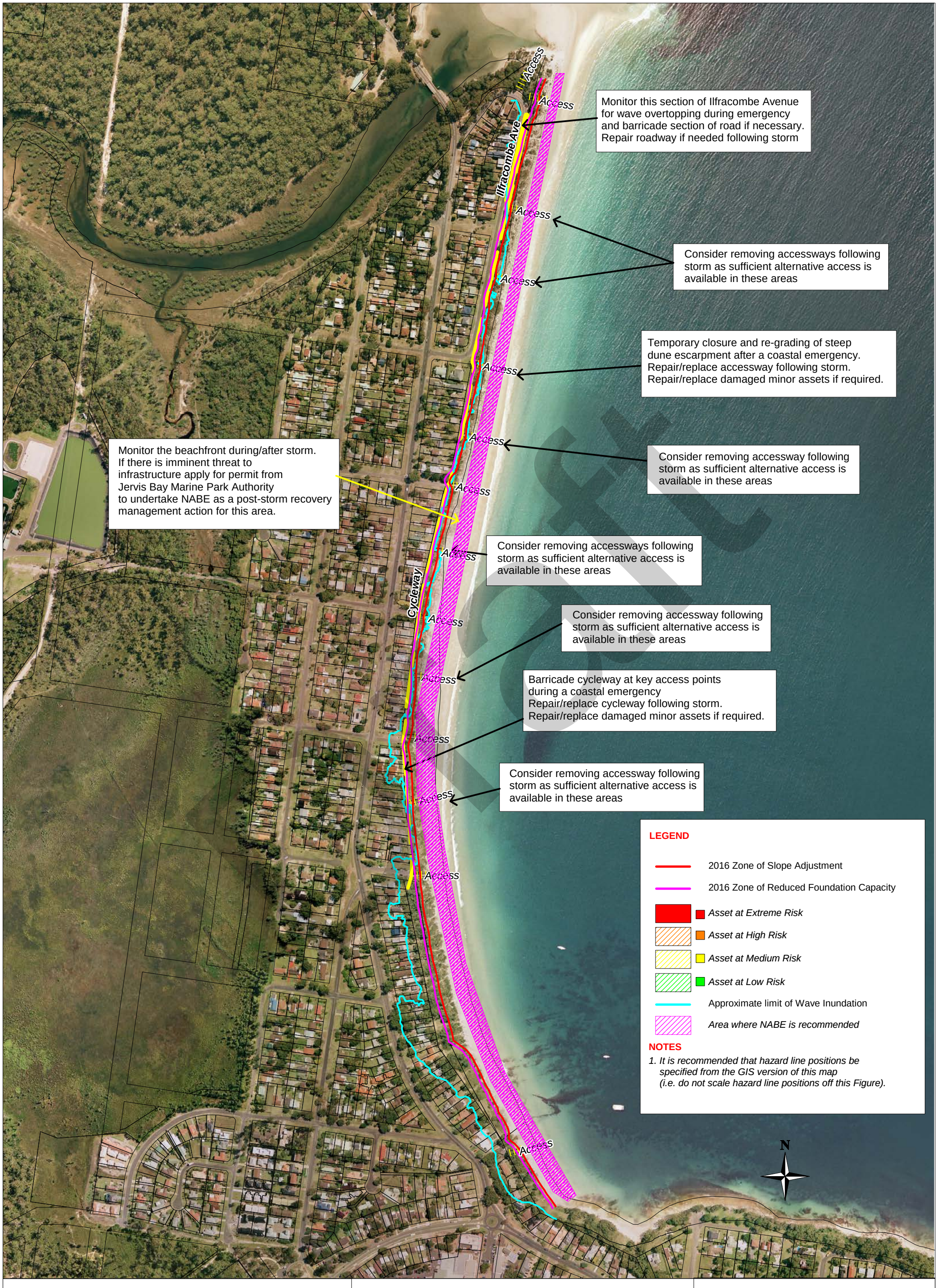
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• Shutdown water and wastewater infrastructure affected by beach erosion, coastal inundation, or cliff and slope instability hazards. Erect barricades and signs, as necessary.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.
	  • Temporary barricade/close the cycleway and/or Ilfracombe Avenue if affected by coastal inundation/dune overtopping and determined unsafe for public use.
	  • Seek professional coastal or geotechnical engineering advice where major infrastructure is believed to be at risk. Advice should also be sought from DPE, and/or external expertise where appropriate.

After (immediate)	• Assess storm damage when a safety hazard and risk assessment has determined an acceptable risk level to allow implementation.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Assess the structural integrity of any damaged infrastructure. Seek professional engineering advice as required.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic and environmental impact, it should be permanently closed and removed from Councils asset register.
	  • Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	  • Consider raising dune heights (e.g., to 5.5m AHD south of Susan Street and 6 m AHD in the vicinity of Ilfracombe Avenue) to prevent future over wash of dune area. Where determined applicable, implement the measure, and vegetate in accordance with relevant dune management plan.
	  • Reestablish damaged dune vegetation along entire beachfront reserve and manage in accordance with relevant dune management plan.
	  • Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	  • Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.
	  • Repair Roadway/Cycle way at Illfracombe Avenue if needed.
	  • Monitor and repair/replace sewerage and stormwater infrastructure that is damaged as a result of the impacts from coastal erosion hazard.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



DATE 27/04/18

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Collingwood 2016 Risk Map - Beach Access Emergency Action Subplan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

09 - NELSONS BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Marine Parks
Crown land
Jerrinja LALC
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Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
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• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Nelsons Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Plantation Point Parade Road and Car Park</td><td colspan="2">• Reduced Foundation Capacity
• Inundation Risk</td><td>Moderate</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

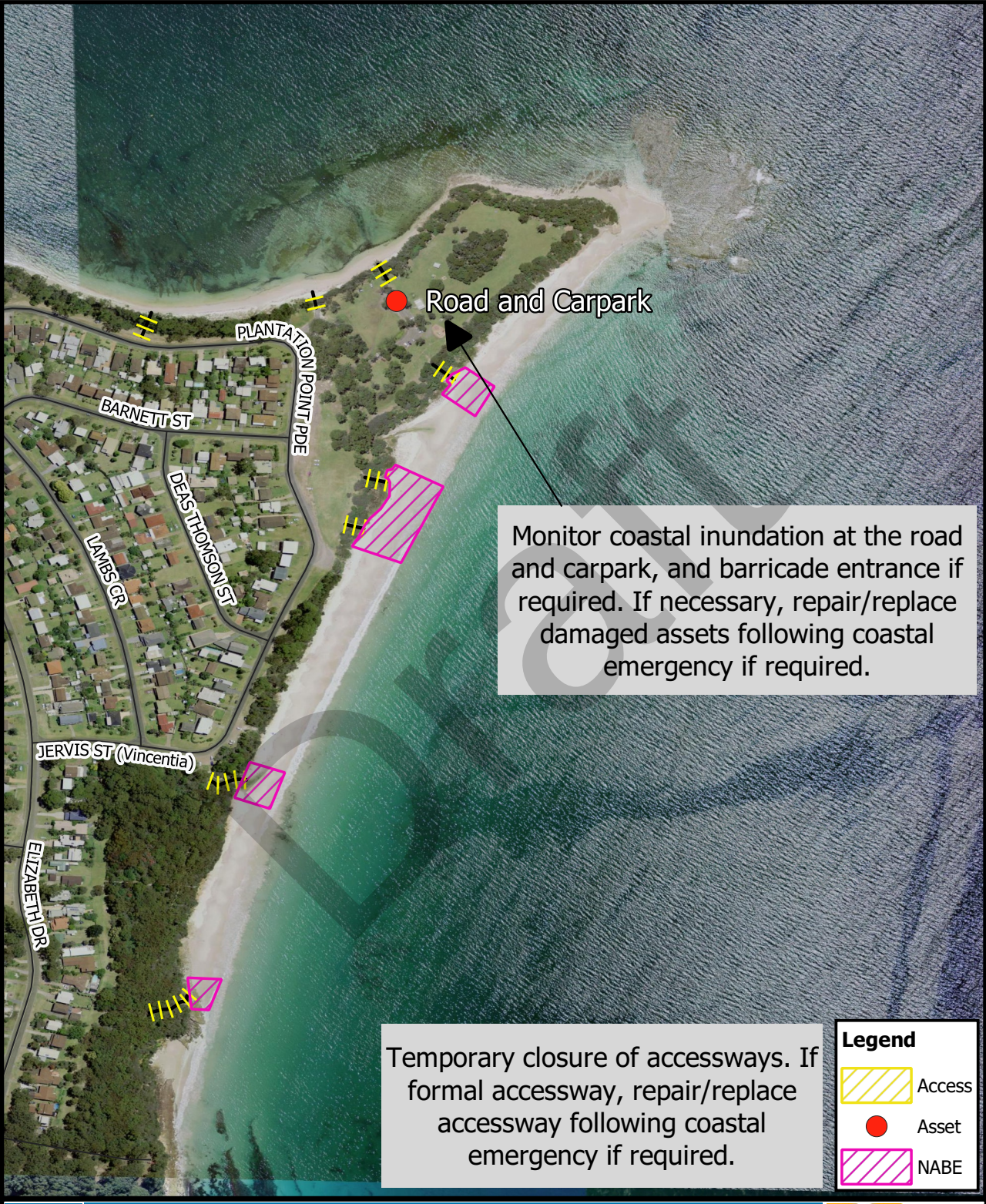
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the Plantation Point Parade Road and car park. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along public beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



0 50 100 m

Job Name: Shoalhaven Open Coast CMP - CZEAS

Nelsons Beach 2023 Emergency Action Reference Guide Map

2023-06-23T16:43:08.823

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10 - HYAMS BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

<table>
<tr><td rowspan="2">Triggers for Action

The following triggers activate the ‘During storm actions’ outlined within this guide:</td><td colspan="3">• The release of the following warnings from BOM that are geographically relevant to the Shoalhaven LGA coastline -http://www.bom.gov.au/nsw/warnings/

○ “Severe Weather Warning for Damaging Surf”
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Crown land
Jerrinja LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Hyams Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Parts of 16 private lots</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Moderate</td></tr>
<tr><td>Little Hyams Beach access road and car park</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Moderate</td></tr>
<tr><td>Little Hyams Beach boat ramp</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Moderate</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the Little Hyams Beach access road, car park, and boat ramp. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure (such as the Little Hyams Beach access road, car park, and boat ramp) where required to mitigate risk.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along public beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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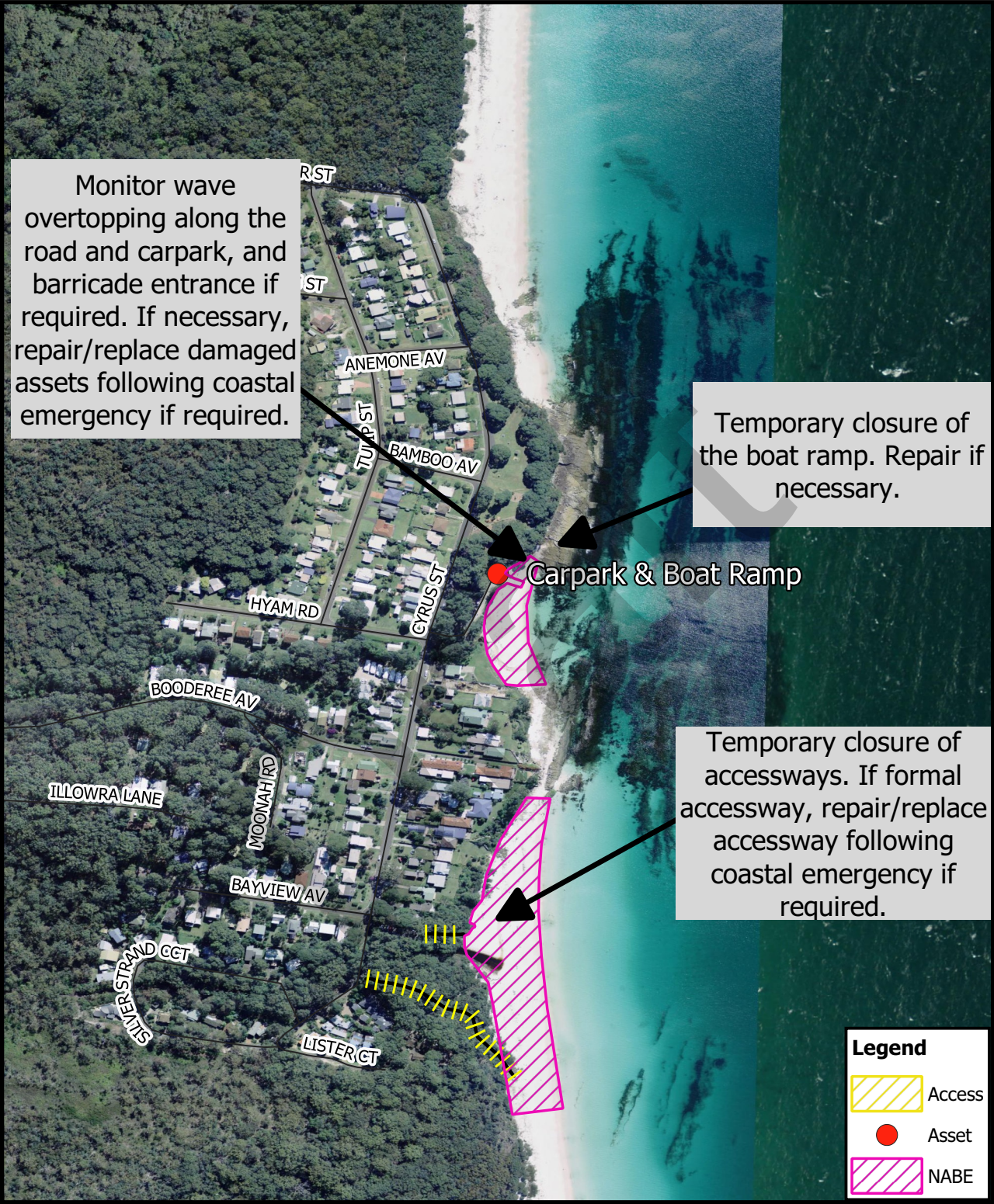
Monitor wave overtopping along the road and carpark, and barricade entrance if required. If necessary, repair/replace damaged assets following coastal emergency if required.
Temporary closure of the boat ramp. Repair if necessary.
Carpark & Boat Ramp
Temporary closure of accessways. If formal accessway, repair/replace accessway following coastal emergency if required.
ANEMONE AV
TUPIA ST
BAMBOO AV
CYRUS ST
HYAM RD
BOODEREE AV
ILLOWRA LANE
MOONAH RD
BAYVIEW AV
SILVERSTRAND CCT
LISTER CT
Legend
Access
Asset
NABE
0
50
100 m
Job Name: Shoalhaven Open Coast CMP - CZEAS
Hyams Beach 2023 Emergency Action Reference Guide Map
2023-06-23T16:30:43.533
M:\21010472_Shoalhaven Open Coast CMP\Spatial\Workspaces\CZEAS\Shoalhaven_OC_CMP\CZEAS_ShoalhavenOpenCoast.qgz

11 - BENDALONG BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

<table>
<tr><td rowspan="2">Triggers for Action

The following triggers activate the ‘During storm actions’ outlined within this guide:</td><td colspan="3">• The release of the following warnings from BOM that are geographically relevant to the Shoalhaven LGA coastline -http://www.bom.gov.au/nsw/warnings/

○ “Severe Weather Warning for Damaging Surf”
○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
<tr><td colspan="3">• Subject Matter Expert advice applied to assess when to initiate actions as required, which relies on regular monitoring of environmental conditions and beach behavior.</td></tr>
<tr><td rowspan="2">Stakeholders and contacts
(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
<tr><td>City Services
City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Crown land
Jerrinja LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Bendalong
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Playground and public carpark at western end</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Medium-High</td></tr>
<tr><td>Picnic area and public carpark at eastern end (east of boat ramp)</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>Medium-High</td></tr>
<tr><td>Red Point Road along beach frontage</td><td colspan="2">• Erosion Risk
• Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.
	  • Temporary barricade/closure of Manta Ray Road if affected by coastal inundation.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the playgrounds and public carparks. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate. NABE may help to reduce risk of erosion of dune, loss of middens, and damage to picnic areas/carpark/playground following consultation with SCC's Coastal coordinator for approval.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation –consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along public beachfront reserve and manage in accordance with relevant dune management plan.
	• Remove, replace, or repair minor infrastructure (e.g., picnic facilities, garbage bins etc.) that have been impacted on by storm events where required.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft

LEGEND

- 2016 Zone of Slope Adjustment
- 2016 Zone of Reduced Foundation Capacity
- *Asset at Extreme Risk*
- *Asset at High Risk*
- *Asset at Medium Risk*
- *Asset at Low Risk*
- Approximate limit of Wave Inundation

N

NOTES

1. *It is recommended that hazard line positions be specified from the GIS version of this map (i.e. do not scale hazard line positions off this Figure).*

Repair playground/carpark/
minor assets if needed following storm

Implement recommended
stormwater management strategy.

Monitor this section of Red Point Road
for wave overtopping during emergency
and barricade section of road if necessary.
Repair roadway if needed following storm

Repair picnic area and minor
assets if needed following storm

Beach scraping with existing boulders
as per recommendations of Bendalong
Boat Harbour Coastal Mapping Study
to enhance resilience of this area.
Post storm repair.

0 10 20
metres

DATE	27/4/18	**COORDINATE SYSTEM**	MGA Zone 56
PROJECT NO.	301015-03933	**PROJECT TITLE**	Shoalhaven Coastal Mapping
FIGURE TITLE	Bendalong Boat Harbour - 2016 Risk Map Emergency Action Subplan		
CREATED BY	C. Adamantidis		

Shoalhaven City Council

Advisian
WorleyParsons Group

12 - NARRAWALLEE BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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DPI-Fisheries
Crown land
Ulladulla LALC
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Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
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• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Narrawallee Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Public reserve and amenities</td><td colspan="2">• Inundation Risk</td><td>Medium</td></tr>
<tr><td>Wastewater infrastructure (pump station and connecting mains) at southern end of the beach</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
</table>

Draft

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

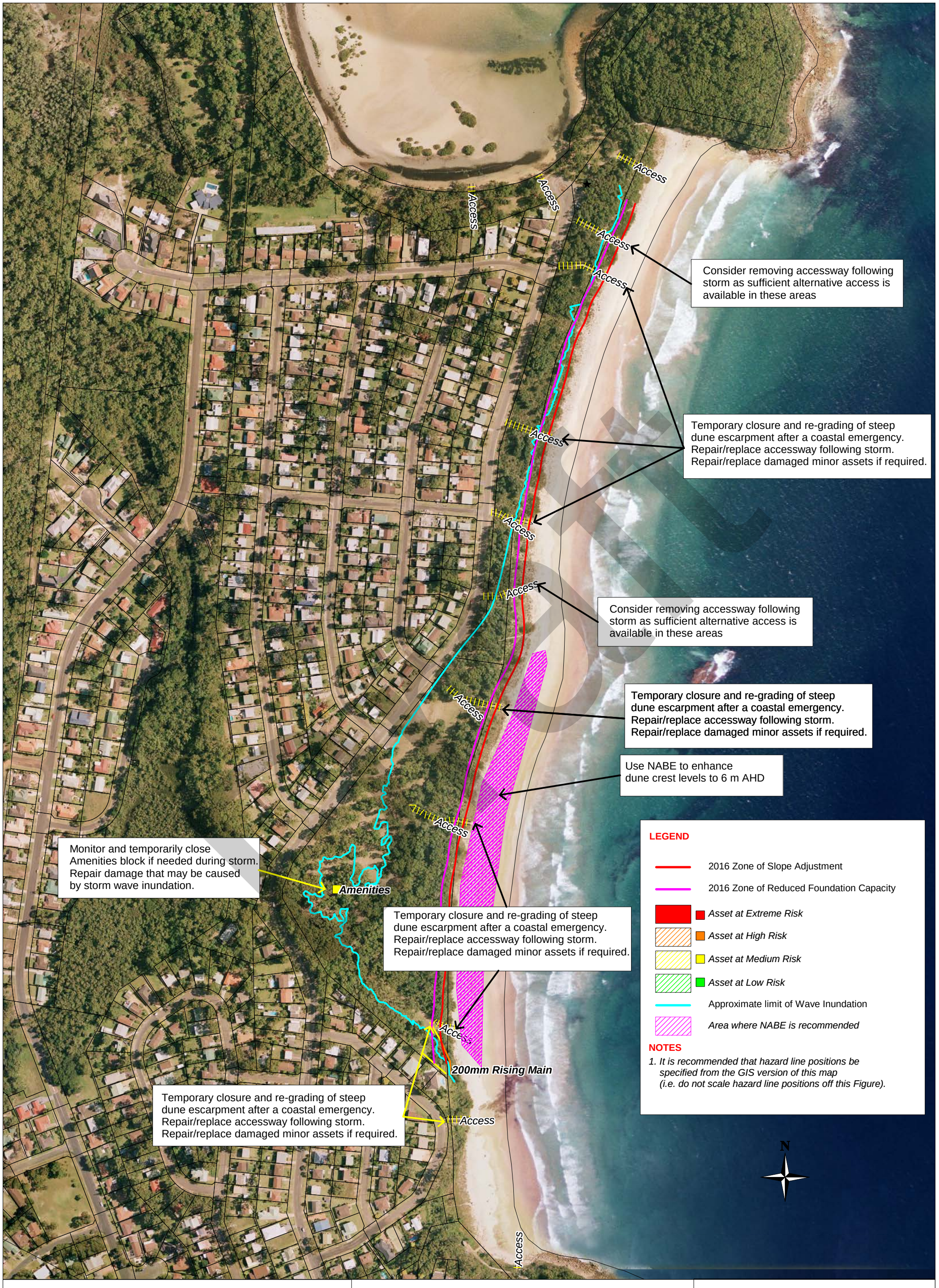
During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• Shutdown wastewater infrastructure affected by beach erosion, coastal inundation, or cliff and slope instability hazards. Erect barricades and signs, as necessary.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use.
	  • Erect temporary safety fencing and associated warning signage.
	  • Monitor and temporarily close amenities block if needed.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the amenities block and wastewater pump station. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate. NABE may help to reduce risk of erosion of dune, following consultation with SCC's Coastal coordinator for approval.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Reestablish damaged dune vegetation along the south-central half of the beach to reduce the inundation risk due to wave run-up and reduce the landward movement due to storm erosion. Once the dune is raised, stabilise with native vegetation in accordance with the NSW Dune Management Manual guidance.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

Draft



DATE 27/04/18 — 0, 50, 100 metres

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Narrawallee 2016 Risk Map - Beach Access Emergency Action Subplan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

13 - MOLLYMOOK BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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Crown land
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• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Mollymook Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Golf Club (currently protected by a gabion mattress revetment)</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Wastewater infrastructure including mains and pump station at southern end of beach</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Wastewater infrastructure along MitchellParade</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>Extreme</td></tr>
</table>

Draft

Wastewater pump station and amenities at Beach Road	• Erosion Risk • Zone of Reduced Foundation Capacity • Inundation Risk	High
Public road: Parts of Golf Avenue/Ocean Street	• Zone of Reduced Foundation Capacity • Inundation Risk	High
Public road: Parts of Mitchell Parade north of Donlan Road	• Zone of Reduced Foundation Capacity • Inundation Risk	High
Stormwater Outlets along Mitchell Parade	• Erosion Risk • Zone of Reduced Foundation Capacity • Inundation Risk	Extreme

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• Shutdown wastewater infrastructure affected by beach erosion, coastal inundation, or cliff and slope instability hazards. Erect barricades and signs, as necessary.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use. Erect temporary safety fencing and associated warning signage.
	  • Barricade road at intersection of Ocean Street and Golf Avenue if subject to wave overtopping but maintain emergency access to SLSC.
	  • Monitor wastewater infrastructure along Mitchell Parade.
	  • Monitor coastal protection works at intersection of Ocean Street and Golf Avenue.
	  • Monitor stormwater outlets along Mitchell Parade.
	  • Monitor tripper wall structures at Blackwater Creek and Mollymoke Farm Creek.
	  • Monitor amenities block at the northern end of the beach.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the public roads, coastal protection works, wastewater infrastructure, stormwater outlets, tripper walls, and amenities block. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• If required undertake NABE at the area in front of the Golf Club to cover the existing Gabions revetment as well as at northern section of Beach Rd to build up toe of bank and encourage formation of foredune encourage development of an incipient foredune in this area, following consultation with SCC's Coastal coordinator for approval.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate at any other locations - following consultation with SCC's Coastal coordinator for approval.
	• Following heavy rainfall, undertake NABE / beach scraping locally around the stormwater outlets to repair scour caused by stormwater flows.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently

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	closed and removed from Councils asset register. • Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval. • Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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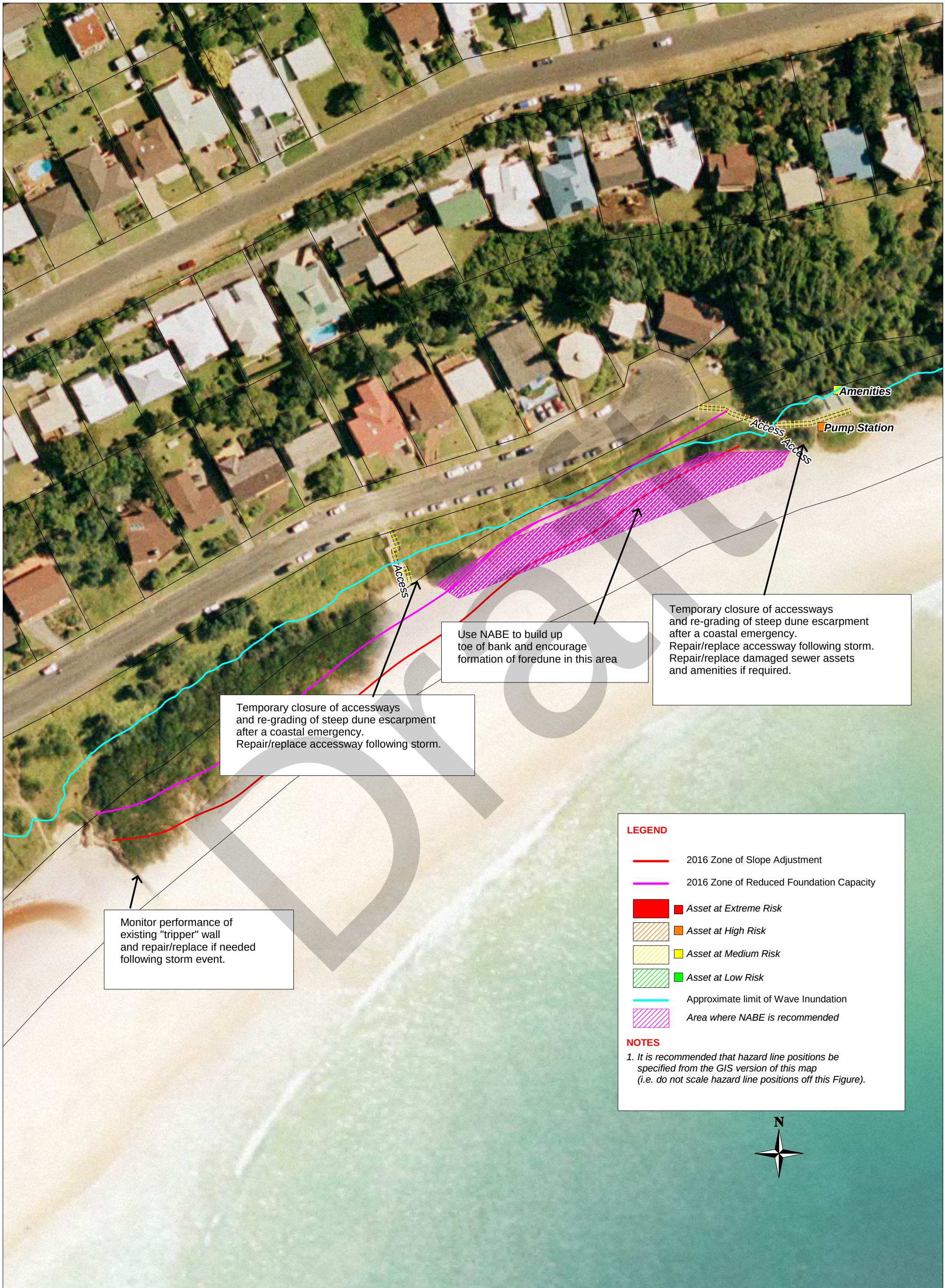

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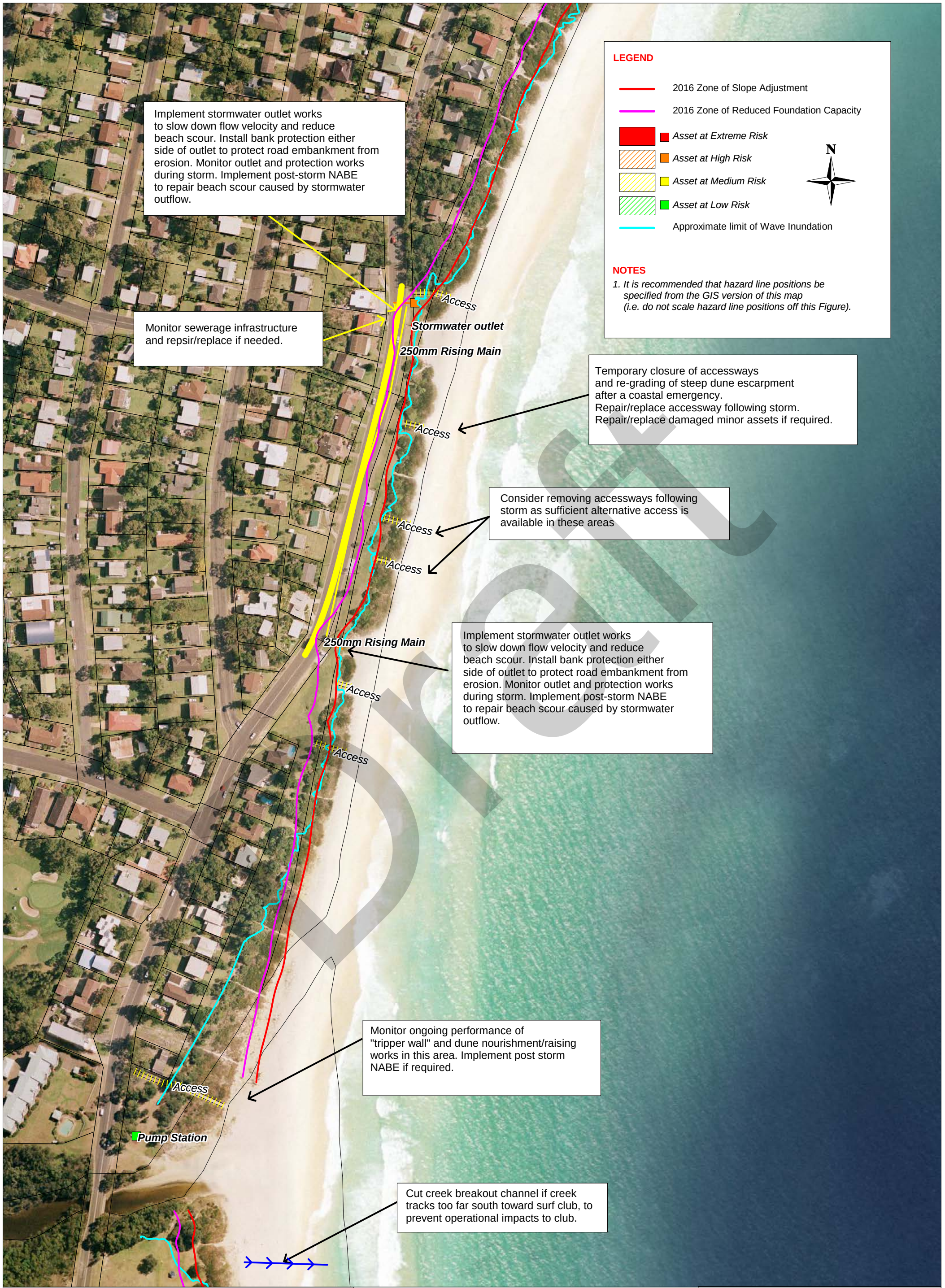
DATE 27/04/18	**COORDINATE SYSTEM** MGA Zone 56	**FIGURE TITLE** Mollymook North 2016 Risk Map Emergency Action Subplan	Shoalhaven City Council · Advisian WorleyParsons Group
PROJECT NO. 301015-03933	**PROJECT TITLE** Shoalhaven Coastal Risk Mapping	**CREATED BY** C. Adamantidis	



DATE 27/04/18

0 25 50 metres

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

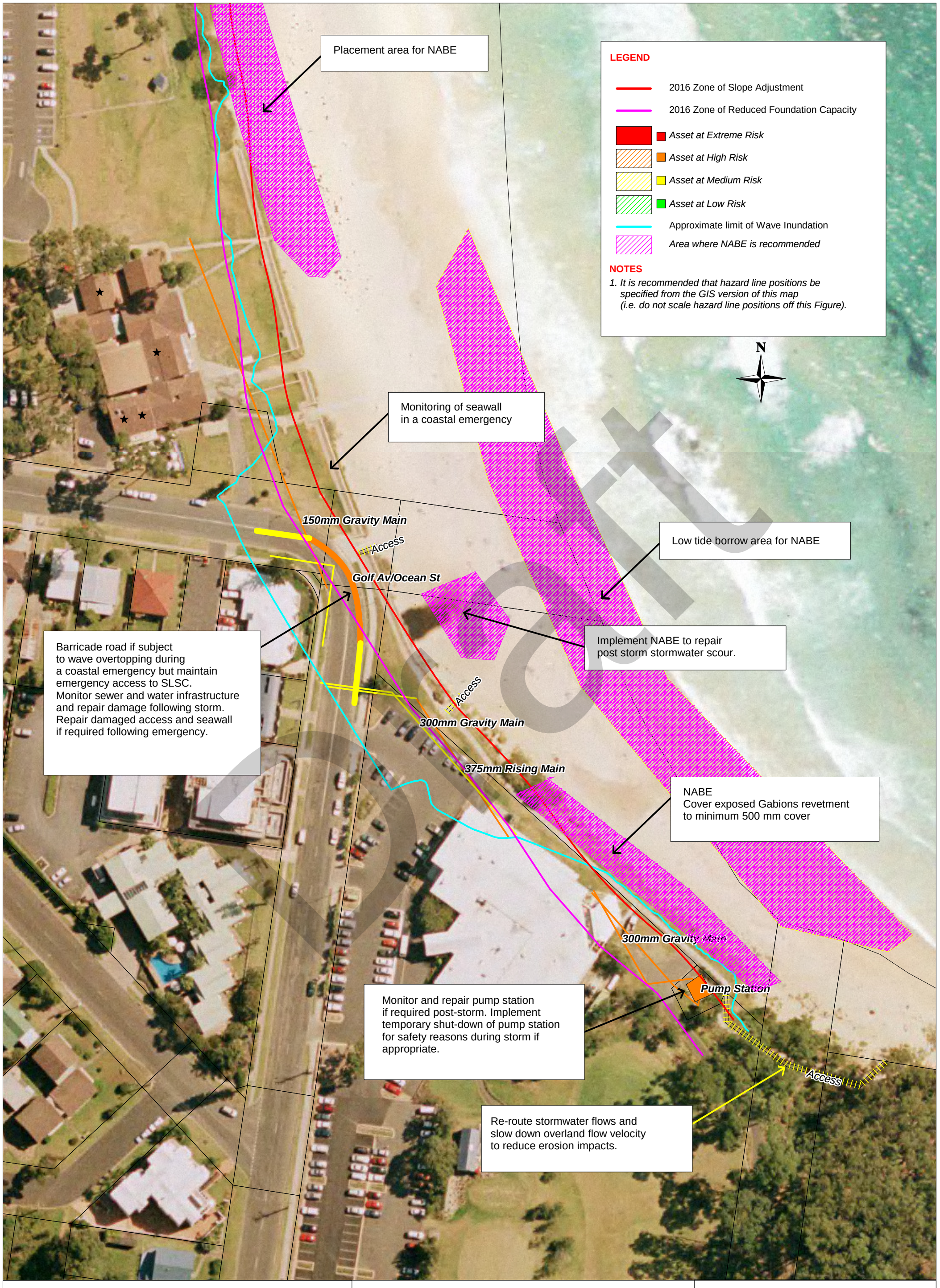
PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Mollymook Central 2016 Risk Map Emergency Action Plan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group



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DATE 27/04/18

0 10 20 metres

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Mollymook South 2016 Risk Map Emergency Action Subplan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian WorleyParsons Group

14 - COLLERS BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

<table>
<tr><td rowspan="2">Triggers for Action

The following triggers activate the ‘During storm actions’ outlined within this guide:</td><td colspan="3">• The release of the following warnings from BOM that are geographically relevant to the Shoalhaven LGA coastline -http://www.bom.gov.au/nsw/warnings/

○ “Severe Weather Warning for Damaging Surf”
○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
<tr><td colspan="3">• Subject Matter Expert advice applied to assess when to initiate actions as required, which relies on regular monitoring of environmental conditions and beach behavior.</td></tr>
<tr><td rowspan="2">Stakeholders and contacts
(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
<tr><td>City Services
City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Crown land
Ulladulla LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Collers Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Wastewater infrastructure including mains and pump station</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Private dwellings</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>Medium</td></tr>
</table>

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Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• Shutdown wastewater infrastructure affected by beach erosion, coastal inundation, or cliff and slope instability hazards. Erect barricades and signs, as necessary.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use. Erect temporary safety fencing and associated warning signage.
	  • Barricade road at the end of Riversdale Ave if the Collers Beach car park is subject to wave overtopping.
	  • Monitor wastewater infrastructure.

After (immediate)	• Assess the structural integrity of any damaged infrastructure – including the public roads, and wastewater infrastructure. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate. NABE may help to reduce risk of erosion of dune, following consultation with SCC's Coastal coordinator for approval.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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DATE 27/04/18

COORDINATE SYSTEM MGA Zone 56

PROJECT NO. 301015-03933

PROJECT TITLE Shoalhaven Coastal Risk Mapping

FIGURE TITLE Collers 2016 Risk Map
Emergency Action Plan

CREATED BY C. Adamantidis

Shoalhaven City Council

Advisian
WorleyParsons Group

15 - ULLADULLA HARBOUR BEACHES

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

The Shoalhaven Open Coast and Jervis Bay Coastal Management Program (CMP) Coastal Zone Emergency Action Subplan (CZEAS) outlines potential actions that can be applied to all beaches in the Shoalhaven LGA before, during, and following a coastal emergency event – and the roles and responsibilities of key stakeholders in implementing those actions. This guide is prepared for internal Council staff undertaking emergency actions and summarizes site-specific actions for this beach. Council is the designated public authority with responsibility for public land within its care, control, management, and coastal emergency protective works to protect public assets.

The actions outlined in this document are to be undertaken in accordance with the provisions of Councils Work Health and Safety Management System. The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the over the execution of any actions outlined in this document.

Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

Long term coastal protection measures and broader city-wide emergency response actions that may be applied to all Council managed beaches in the LGA to mitigate risk of storm impact can be found in the CMP document.

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○ “Severe Weather Warning for Storm Tides”
or;</td></tr>
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(contact SCC environmental services Coastal management for specific stakeholder contact details)</td><td>Internal (SCC)</td><td>Departmental</td><td>Community / Other</td></tr>
<tr><td>City Services
City Development – Environmental services</td><td>State Emergency Service (SES)
DPI-Fisheries
Crown land
Ulladulla LALC
NPWS
Ambulance Service NSW
Fire and Rescue NSW</td><td>CCBs - list</td></tr>
<tr><td>Environmental Management</td><td colspan="3">Contact Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer for advice on applicable:
• Licensing and permits and approvals
• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Ulladulla Harbour Beaches
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Public Road: Princes Highway (protected by rock armored revetment)</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Car park facilities</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Wastewater infrastructure north of car park</td><td colspan="2">• Inundation Risk</td><td>Moderate</td></tr>
</table>

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Wastewater infrastructure and amenities block landwards of sea pool	• Inundation Risk	Moderate

Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• Shutdown wastewater infrastructure affected by beach erosion, coastal inundation, or cliff and slope instability hazards. Erect barricades and signs, as necessary.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways which have been determined unsafe or high risk for public use. Erect temporary safety fencing and associated warning signage.
	  • Barricade Princes Hwy if subject to wave overtopping - but maintain emergency access.
	  • Monitor wastewater infrastructure and amenities blocks.
	  • Monitor the condition of the rock revetment protecting the Princes Highway.

After (immediate)	• Assess the structural integrity of the rock revetment protecting the Princes Highway – including any potential foreshore erosion around the flanks of the structure. Seek professional engineering advice as required.
	• Assess the structural integrity of any damaged infrastructure – including the public roads, and wastewater infrastructure. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Monitor the beach in front of the Princes Highway to assess beach conditions and consult with Council Coastal Coordinator if sand redistribution works are appropriate. Redistributing sand from the Millards Creek entrance delta to in front of the Princes High way may be appropriate following consultation with SCC's Coastal coordinator for approval.
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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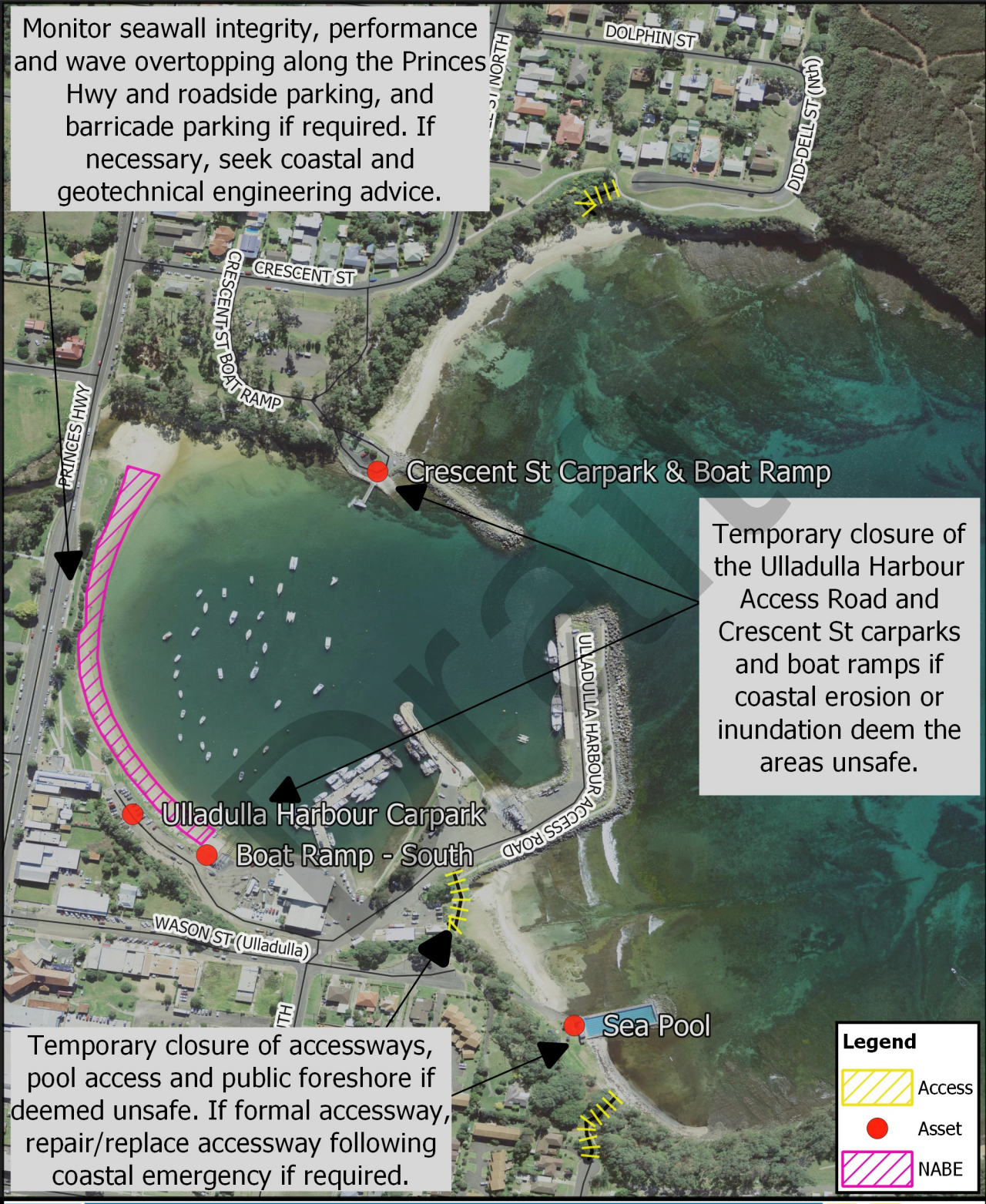
Monitor seawall integrity, performance and wave overtopping along the Princes Hwy and roadside parking, and barricade parking if required. If necessary, seek coastal and geotechnical engineering advice.
DOLPHIN ST
DID-DELL ST (Nth)
CRESCENT ST
CRESCENT ST BOAT RAMP
PRINCES HWY
Crescent St Carpark & Boat Ramp
Temporary closure of the Ulladulla Harbour Access Road and Crescent St carparks and boat ramps if coastal erosion or inundation deem the areas unsafe.
ULLADULLA HARBOUR ACCESS ROAD
Ulladulla Harbour Carpark
Boat Ramp - South
WASON ST (Ulladulla)
Sea Pool
Temporary closure of accessways, pool access and public foreshore if deemed unsafe. If formal accessway, repair/replace accessway following coastal emergency if required.
Legend
Access
Asset
NABE
0 25 50 m
Job Name: Shoalhaven Open Coast CMP - CZEAS
Ulladulla Harbour 2023 Emergency Action Reference Guide Map
2023-06-23T16:39:09.701
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16 - KIOLOA BEACH

EMERGENCY ACTION SUBPLAN – QUICK REFERENCE GUIDE.

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Mapping of the assets at immediate risk from coastal hazards is provided on the following pages.

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Crown land
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NPWS
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• Environmental management plans
• Stakeholder contact details</td></tr>
<tr><td colspan="4">At Risk Assets – Kioloa Beach
See maps on following pages for locations and additional details</td></tr>
<tr><td>Council Asset</td><td colspan="2">Immediate Coastal Hazard</td><td>Risk</td></tr>
<tr><td>Public Road: Scerri Drive and car park (protected by rock revetment)</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
<tr><td>Marine Rescue building and amenities block (protected by rock revetment)</td><td colspan="2">• Erosion Risk
• Zone of Reduced Foundation Capacity
• Inundation Risk</td><td>High</td></tr>
</table>

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Storm response actions to be coordinated in consultation with SCC's Lead - Coastal Management, Environmental Services or appointed Environmental Services Officer.	
Before	• Monitor forecasts for severe weather warnings and assess onsite conditions as per the trigger for the subplan for all beaches. • Discuss and prepare response and recovery actions with relevant stakeholders.

During	• Assess threats to life and property before undertaking any action.
	• The safety of the personnel who might be working under the extreme adverse weather conditions that gave rise to the emergency is to be prioritised over the execution of any actions outlined in this document.
	• When a safety hazard and risk assessment has determined an acceptable risk level to allow implementation:
	  • Close beach accessways from road/carpark which have been determined unsafe or high risk for public use. Erect temporary safety fencing and associated warning signage.
	  • Barricade Scerri Drive and Car Park if subject to wave overtopping - but maintain emergency access for Marine Rescue.
	  • Monitor the condition of the rock revetment protecting the road, carpark, and Marine Rescue Building.

After (immediate)	• Assess the structural integrity of the rock revetment protecting the road, carpark, and Marine Rescue Building – including any potential foreshore erosion around the flanks of the structure. Seek professional engineering advice as required.
	• Assess the structural integrity of any damaged infrastructure – including the public roads, car park, and marine Rescue building and amenities block. Seek professional engineering advice as required.
	• Close off / restrict public access to areas or infrastructure where required to mitigate risk.
	• Monitor the beach and frontal dune to assess beach conditions and consult with Council Coastal Coordinator if NABE is appropriate. NABE may help to reduce risk of erosion of dune, loss of middens, and damage to picnic areas/carpark/playground following consultation with SCC's Coastal coordinator for approval..
	• Consider development and release of media information as required to inform community and stakeholders.
	• Where access terminates at a beach erosion scarp greater than 1 m in height:
	  • Close the beach accessways - erect temporary safety fencing and associated warning signage.
	  • Regrade escarpment to slope of 1V:4H with machinery or other available means. Take care not to damage dune vegetation – consultation with SCC's Lead – Coastal Management required.

Medium – Long term Recovery	• Where the beach scarp is exceedingly high and impractical to collapse to 1V:4H.
	  • Access to remain closed until dune regrades naturally and foredune has recovered. Note: This process may take months to years and may be sped up by Nature Assisted Beach Enhancement (NABE) or beach scraping technique.
	  • If the accessway cannot be restored safely, or where restoration is not viable considering the social, economic, and environmental impact - it should be permanently closed and removed from Councils asset register.
	• Undertake NABE and dune management to enhance post-storm recovery of dune following consultation with SCC's Lead - Coastal Management, Environmental Services for approval.
	• Repair/replace damaged sections of board and chain walkway or beach access in infrastructure in accordance with the NSW Dune Management Manual.

Please contact Lead - Coastal Management, Environmental Services on **1300 293 111** regarding any aspect of delivery of the actions outlined in this document.

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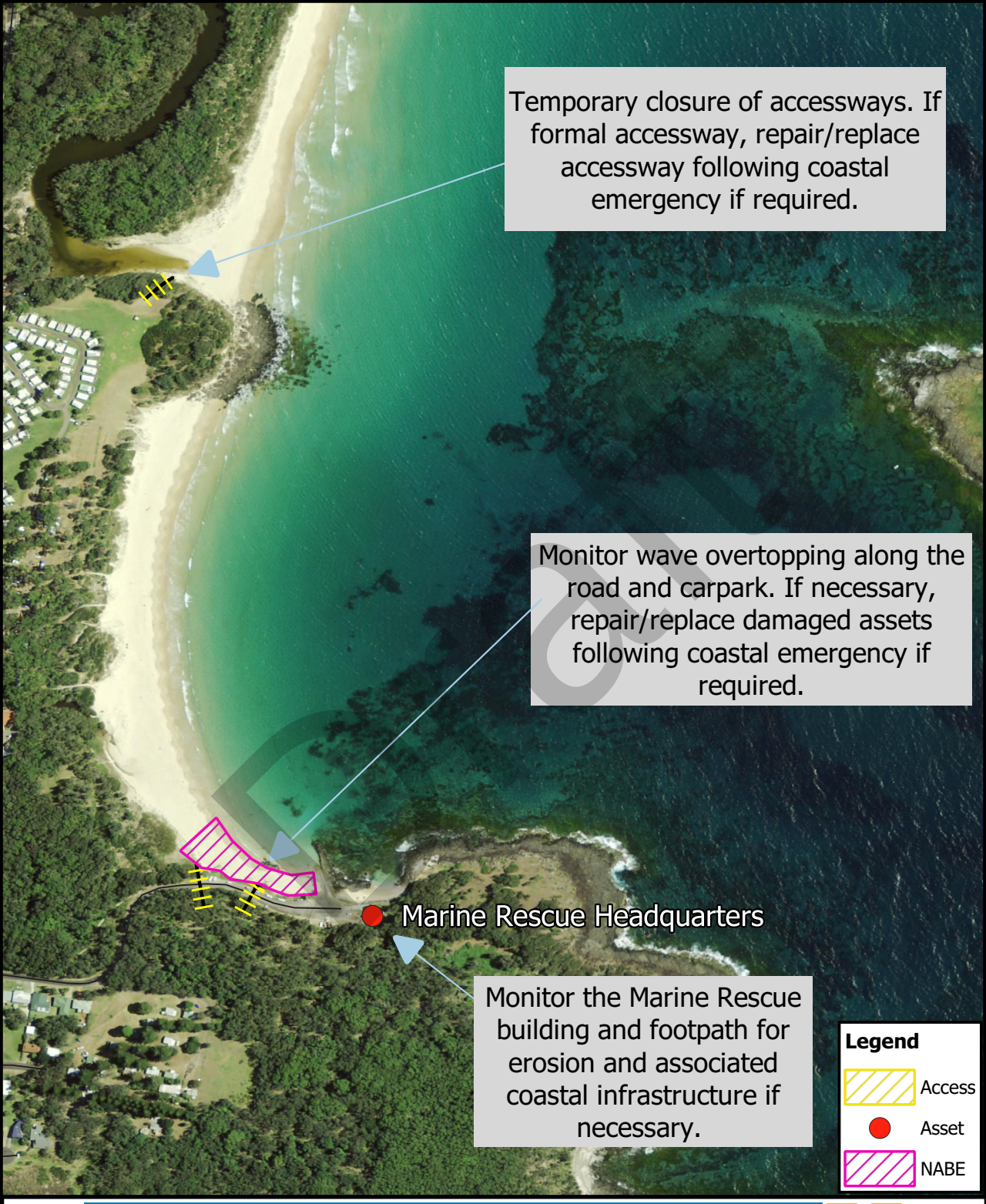

0 50 100 m

Job Name: Shoalhaven Open Coast CMP - CZEAS

Kioloa Beach 2023 Emergency Action Reference Guide Map

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WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

APPENDIX B
COASTAL CLIFFS AND SLOPES - INSPECTION TEMPATES AND COMPANION MAPPING

Draft



Shoalhaven City Council
PO Box 42
Nowra NSW 2541

Attention: Nigel Smith

Email: Nigel.Smith@shoalhaven.nsw.gov.au

Project 212846.00
8 September 2022
R.001.DftA
DJM:jb

Geotechnical Comment
Proposed Coastal Asset, Slope & Cliff Inspection Template
Shoalhaven City Council Local Government Area

Draft

1. Introduction

This letter provides geotechnical comments to assist Shoalhaven City Council (SCC) in the development of a geotechnical inspection template for Coastal Assets, Coastal Slopes and Cliffs within the Shoalhaven Local Government Area (LGA). The templates will be incorporated in SCC policy document *'District Engineer Overview for Asset Monitoring within Coastal Slopes and Cliffs Risk Areas'*, which provides a guide to Shoalhaven City Council (SCC) District Engineers for monitoring of SCC land and public assets.

The work was requested by SCC and was carried out in accordance with Douglas Partners Pty Ltd (DP) Proposal 212846.00.R.001.Rev0 dated 7 March 2022 and Council Order PU037911 dated 5 April 2022.

DP understands that SCC required specialist input from a geotechnical consultant to assist in the preparation of pro-forma inspection and monitoring templates. SCC propose to use these templates for regular and routine inspections to provide a preliminary initial assessment of coastal cliffs and slopes and council assets which are 'at risk' (refer Section 2) of slope instability. Further, it is understood that site specific templates are likely to be developed targeting at risk cliffs, slopes and assets.

DP further understands that these templates will be used to monitor natural areas (coastal slopes and cliffs template) and Council assets (assets template). Based on the preliminary discussions with SCC, Council has indicated that the natural area assessments would likely be undertaken by external consultants and the Council asset assessments would likely undertaken by Council's assets team. Assets identified as being at risk during Council's routine inspections would be initially referred to a Council District Engineer Officer for further assessment and if necessary, to a relevant consultant (geotechnical, structural, coastal, for example) thereafter.

2. Background Information

Council is proposing to implement a regular asset monitoring programme, following an action in their (certified and adopted) Coastal Zone Management Plan (SCC, 2018), Action C6.4: '*Incorporate monitoring of public land and infrastructure, including viewing platforms, stormwater drainage, sewer and water infrastructure in identified coastal cliffs and slopes risk areas, to ascertain any leaks or requirements for repair, into Council's maintenance programs. Relocate viewing platforms where necessary'.* As part of the process of addressing Action C6.4, SCC have engaged DP to prepare this template to assist Council in identifying potential actions.

The development of the *'District Engineer Overview for Asset Monitoring within Coastal Slopes and Cliffs Risk Areas'* document was guided by a 2019 JK Geotech report (JK Geotechics, 2019). JK2019 outlines the results of a geotechnical assessment of foreshore cliff lines within the SCC LGA. The report suggested implementing monitoring inspections of 'at risk' areas on an annual basis and after periods of prolonged or heavy rainfall and/or predicted high tidal levels, particularly where they correspond with storm events. The JK 2019 report also suggested 10-year detailed assessments within 'at risk' areas identified within the report. These included Penguin Head, Plantation Point, Hyams Point, Berrara Point, Inyadda Point, Manyana, Narrawallee, Bannisters Point, Collers Beach Headland, Rennies Beach and Racecourse Beach.

Since the JK2019 report, SCC have set up triggers for what would constitute a 'heavy rainfall or trigger' event. These have been defined by SCC as 'a rainfall rate exceeding 50 mm per hour' and/or a 'recorded rainfall total of 100 mm in a 24 hour period'. The referenced gauges are located at Greenwell Point, Vincentia, Lake Conjola, Ulladulla and Burrill Lake.

DP has carried out a slope stability assessment as part of an update of Coastal Slope and Cliff Hazard Zones within SCC, currently issued in draft format (DP, 2022). This report included additional study areas identified by SCC including; Crookhaven Head, Currarong, Calalla Bay, Huskisson, Vincentia, Hyams Point, Berrara, North Bendalong, Mollymook, Ulladulla Head, Dolphin Point, Bawley Point, Kioloa, Depot Beach and North Durras. In summary, the report includes a risk-based assessment of coastal and slope instability hazards and hazard line for potential localised slope regression.

3. Comments

The purpose of the proforma inspection template is not to provide an AGS hazard and risk assessment of the sites. Rather, the proforma inspection templates will assist SCC to monitor changes at sites and identify areas that will require specialised input (eg from a geotechnical consultant or structural engineer). Due to the lateral extent of some sites, it may be necessary to subdivide sites into manageable portions or to modify the inspection template to have sufficient space to cover large sites.

At this stage, two preliminary inspection pro-forma templates have been prepared and are provided on the following pages. One template targeting at risk assets, and one template targeting at risk coastal slopes and cliffs. It is noted that there is some overlap between the two templates where geotechnical hazards are identified at the asset locations. It is recommended that the inspection form is utilised in combination with a plan or aerial photograph so that the location/s of the items inspected can be recorded, which is expected to be included in future revisions of the templates.

At this preliminary stage, columns have been included for potential actions and/or remediation and referral to a consultant. Although not requested as part of this scope, it will be important to define trigger levels and what may constitute an action, response and/or ongoing monitoring for each of the items listed in Forms 1 and 2, including provision of advice on rectification or remedial works. These may be able to be developed as an add-on to the template as the development of the document and Council policy proceeds.

It must be noted that the below templates (Forms 1 and 2) are provided as a guide. The list of inspection activities provided within Forms 1 and 2 are non-exhaustive list as each site will have individual considerations which may need to be assessed. As such, it is understood that further development of the templates is likely to be required on a site specific basis.

Draft

We note that a query on slope gradients and survey has been included along with references with respect to site geology. This will help address the geological mapping query in the header.

Forms 1 and 2 also identify whether the site is part of an area recorded as being an ancient landslide (eg Bannister Head, the area fronting Narrawallee Beach) and if previous reports by Council/consultants have identified any potential or current landslips. DP are happy to provide mapping and can address additional constraints this could provide on future (site-specific) templates to help address this condition.

We note that if any potential safety concerns are identified by Council as part of the template process, these must immediately be referred to an appropriate consultant for assessment and provision of advice.

Draft

Form 1: Coastal Slopes and Cliff

PROJECT	COASTAL SLOPES AND CLIFFS INSPECTION TEMPLATE
LOCATION	*(Include Easting, Northing, RL, extents where possible)*
SUBJECT	

Regional Geology: Tertiary Sediments | Colluvium | Weathered Basalt / Volcanics | Permian Aged Bedrock | Sands / Quaternary Alluvium | Other / Unknown

REFERENCE: Shoalhaven Geological Mapping **Mapping Unit (From Geological Map):** (e.g. RWa)

Inspection by: *(Name / Position)* **Date:**

Verified by: *(Name/Position)* **Time:**

Site Plan:	**Contour Mapping / Site Slopes:**	**Identification of Potential, Current or Ancient Landslides:**
	Do site slopes (including formed cuts/fills) identified on maps or during site inspections exceed 1:2 (H:V)?	*Is the site located in an area which has been previously identified as a potential, current or ancient landslide area? (refer Previous Geotechnical Reports).*

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
1.0	**Coastal Slopes**						
	Is cracking or vertical displacement present above the crest of the slope or in the slope? If yes, is it new or existing cracking or vertical displacement.						
	If existing, has the cracking/vertical displacement increased since the last inspection?						
	Is there any pooling of water above the slope crest or within cracking/depressions? If yes, is there any erosion or scour associated with it?						
	Is there water ponding at the toe of the slope? Is it seepage or rainfall?						
	Is there any seepage or areas of greener vegetation on the slope or at the toe?						
	Is there any water flow from the toe or the slope? If so, is it clear?						
	Are there any trees or shrubs with a downslope lean or bow in the trunk?						
	Are there any signs of landsliding in the slope (eg backscarps)?						
	Is there any accumulated debris on the slope or at the toe?						
	Are there any signs of erosion at the toe of the slope? If so, what is the height of the erosion.						

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
2.0	**Drainage Pathways & Depressions**						
	Is the drainage pathway clear of debris?						
	Are there signs of erosion and scour in the drainage pathway?						
3.0	**Coastal Cline Lines**						
	Is cracking or open jointing present in the cliff face? If yes, has it increased since the last inspection?						
	Are tree roots visible in the open joints?						
	Are any sections of the cliff line undercut by more than 0.5 m? If so, how deep is the undercutting?						
	Are there any blocks accumulated at the base of the cliff line?						
	Is there any debris accumulated at the base of the cliff line?						
	Is there any seepage from the cliff face?						
4.0	**Stormwater Drains**						
	Are stormwater pits and grates clear of debris?						
	Is there any signs of cracking about drainage structures?						
	Is there any evidence of erosion or scour nears discharge structures?						
	Have overland stormwater flows 'jumped' the kerb at any locations?						

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
5.0	**Retaining Walls / Structural Slabs**						
	Have retaining walls deviated (eg deflected, rotated) from their as-built geometry?						
	Is there any obvious cracking or damage to the retaining wall?						
	Any signs of cracking or movement in structural slabs and/or footings						
6.0	**Roads**						
	Are there any signs of damage or deterioration to access roads (eg pot-holes, rutting, depressions).						
	Is there any arcuate cracking or vertical displacement in the wearing course? If yes, is it new or existing cracking or vertical displacement.						
	If existing, has the cracking/vertical displacement increased since the last inspection?						
	Are there any signs of cracking or displacement in the concrete kerb? If yes, is it new or existing cracking or displacement.						
	Are there any large trees near the cracking/displacement?						
	Is there evidence the kerb has been driven over by a heavy vehicle?						
	Are light/power poles tilted? If so, in which direction?						
7.0	**Climate Data**						
	Has there been any significant rainfall events in the last month? (>50mm/hr rate or >100mm in 24 hours)						
	If so, did they co-inside with high predicted tides (say >1.5 m)						

Draft

Form 2: Council Assets Inspection

PROJECT	COUNCIL ASSET INSPECTION TEMPLATE
LOCATION	*(Include Easting, Northing, RL, extents where possible)*
SUBJECT	

Regional Geology: Tertiary Sediments | Colluvium | Weathered Basalt / Volcanics | Permian Aged Bedrock | Sands / Quaternary Alluvium | Other / Unknown

REFERENCE: Shoalhaven Geological Mapping **Mapping Unit (From Geological Map):** (e.g. RWa)

Inspection by: *(Name / Position)* **Date:**

Verified by: *(Name/Position)* **Time:**

Site Plan:	**Contour Mapping / Site Slopes:**	**Identification of Potential, Current or Ancient Landslides:**
	Do site slopes (including formed cuts/fills) identified on maps or during site inspections exceed 1:2 (H:V)?	*Is the site located in an area which has been previously identified as a potential, current or ancient landslide area? (refer Previous Geotechnical Reports).*

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
0.0	**Asset Identification** Has the area been identified as an at risk coastal slope or cliff (refer mapping on Page 1).	If yes, proceed with Parts 1.0 – 3.0. If no, proceed to Part 4.0					
1.0	**Coastal Slopes**						
	Is cracking or vertical displacement present above the crest of the slope or in the slope? If yes, is it new or existing cracking or vertical displacement.						
	If existing, has the cracking/vertical displacement increased since the last inspection?						
	Is there any pooling of water above the slope crest or within cracking/depressions? If yes, is there any erosion or scour associated with it?						
	Is there water ponding at the toe of the slope? Is it seepage or rainfall?						
	Is there any seepage or areas of greener vegetation on the slope or at the toe?						
	Is there any water flow from the toe or the slope? If so, is it clear?						
	Are there any trees or shrubs with a downslope lean or bow in the trunk?						
	Are there any signs of landsliding in the slope (eg backscarps)?						
	Is there any accumulated debris on the slope or at the toe?						
	Are there any signs of erosion at the toe of the slope? If so, what is the height of the erosion.						

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
2.0	**Drainage Pathways & Depressions**						
	Is the drainage pathway clear of debris?						
	Are there signs of erosion and scour in the drainage pathway?						
3.0	**Coastal Cline Lines**						
	Is cracking or open jointing present in the cliff face? If yes, has it increased since the last inspection?						
	Are tree roots visible in the open joints?						
	Are any sections of the cliff line undercut by more than 0.5 m? If so, how deep is the undercutting?						
	Are there any blocks accumulated at the base of the cliff line?						
	Is there any debris accumulated at the base of the cliff line?						
	Is there any seepage from the cliff face?						
4.0	**Stormwater Drains**						
	Are stormwater pits and grates clear of debris?						
	Is there any signs of cracking about drainage structures?						
	Is there any evidence of erosion or scour nears discharge structures?						
	Have overland stormwater flows 'jumped' the kerb at any locations?						

Draft

Item	Description of Inspection Activity	Comment	Map ID	Related Photos No's	Actions / Remediation?		Referred to Consultant
					Started	Completed	
5.0	**Retaining Walls / Structural Slabs**						
	Have retaining walls deviated (eg deflected, rotated) from their as-built geometry?						
	Is there any obvious cracking or damage to the retaining wall?						
	Any signs of cracking or movement in structural slabs and/or footings						
6.0	**Roads**						
	Are there any signs of damage or deterioration to access roads (eg pot-holes, rutting, depressions).						
	Is there any arcuate cracking or vertical displacement in the wearing course? If yes, is it new or existing cracking or vertical displacement.						
	If existing, has the cracking/vertical displacement increased since the last inspection?						
	Are there any signs of cracking or displacement in the concrete kerb? If yes, is it new or existing cracking or displacement.						
	Are there any large trees near the cracking/displacement?						
	Is there evidence the kerb has been driven over by a heavy vehicle?						
	Are light/power poles tilted? If so, in which direction?						
7.0	**Climate Data**						
	Has there been any significant rainfall events in the last month? (>50mm/hr rate or >100mm in 24 hours)						
	If so, did they co-inside with high predicted tides (say >1.5 m)						

Draft

4. References

Department of Mines. (1974). *Geology of Ulladulla 1:250 000 Metallogenic Map Sheet No S1 56-13.* NSW State Archives and Records.

Department of Primary Industries. (2004). *Comprehensive Coastal Assessment Bedrock Geology – Digital Data Set. NSW Department of Primary Industries – Mineral Resources.* Geological Survey of New South Wales.

DP. (2022). *Slope Stability Assessment, Update of Coastal Slope and Cliff Hazard Zones, Shoalhaven City Council LGA.* 72051.11: Douglas Partners Pty Ltd.

JK Geotechics. (2019). *Geotechnical Report, Shoalhaven City Council Local Government Area.* Document D19/319860: J K Geotechnics.

SCC. (2018). *Coastal Zone Management Plan.* Document D18/379377: Shoalhaven City Council.

5. Limitations

Douglas Partners (DP) has prepared this letter for Shoalhaven City Council in accordance with DP's proposal 212846.R.001 dated 7 March 2022 and acceptance received from Nigel Smith dated 5 April 2022. The work was carried out under a modified version of AS4122 and Shoalhaven City council Purchase Order PU037911 dated 5 April 2022.

This report is provided for the exclusive use of Shoalhaven City Council for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

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This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd Reviewed by

David Metcalf **J.Braybrooke**
Geotechnical Engineer / Associate Principal

Attachments: About this Report

Draft

CROOKHAVEN HEADS ACCESS ROAD

CROOKHAVEN BOAT RAMP

PRINCE EDWARD AV

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Crookhaven Heads

2023-10-21T16:52:57.911

PENGUINS HEAD RD

DUKE ST

EASTBOURNE AV

FARRANT AV

FAIRLIGHT WAY

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

DRAFT

Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Penguin Head

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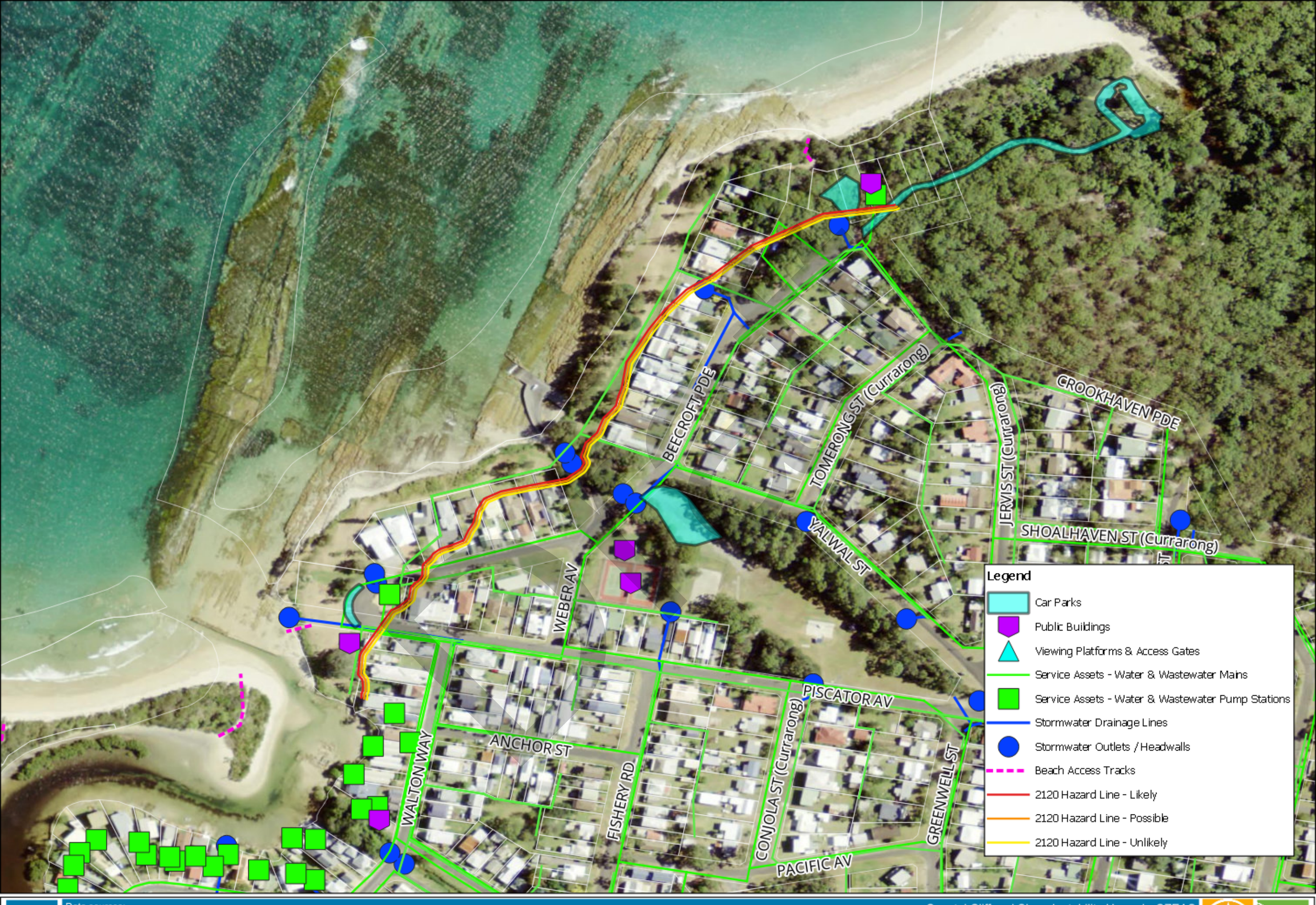


Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Currarong

2023-10-21T16:59:18.787



Data sources:

Contains Vicmap Information © State of Victoria 2023

Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Callala Bay

2023-10-21T17:01:40.855



Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Huskisson

2023-10-21T17:03:38.273



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Vincentia

2023-10-21T17:07:31.652

PLANTATION POINT PDE
BARNETT ST
LAMBS CR
DEAS THOMSON ST
SAUMAREZ ST
ELIZABETH DR
JERVIS ST (Vincentia)
THARWA RD

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Plantation Point

2023-10-21T17:10:12.661

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

ANEMONE AV
TULIP ST
BAMBOO AV
HYAM RD
CYRUS ST
BOODEREE AV
MOONAH RD
ILLOWRA LANE
BAYVIEW AV
SILVER STRAND CCT
LISTER CT

Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Hyams Beach

2023-10-21T17:15:29.100



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Berrara

2023-10-21T17:19:51.269

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

BIRCH RD

PINE ST

HOLLY ST

CYPRESS ST

BELAH GLEN

NORTH BENDALONG RD

DRAFT

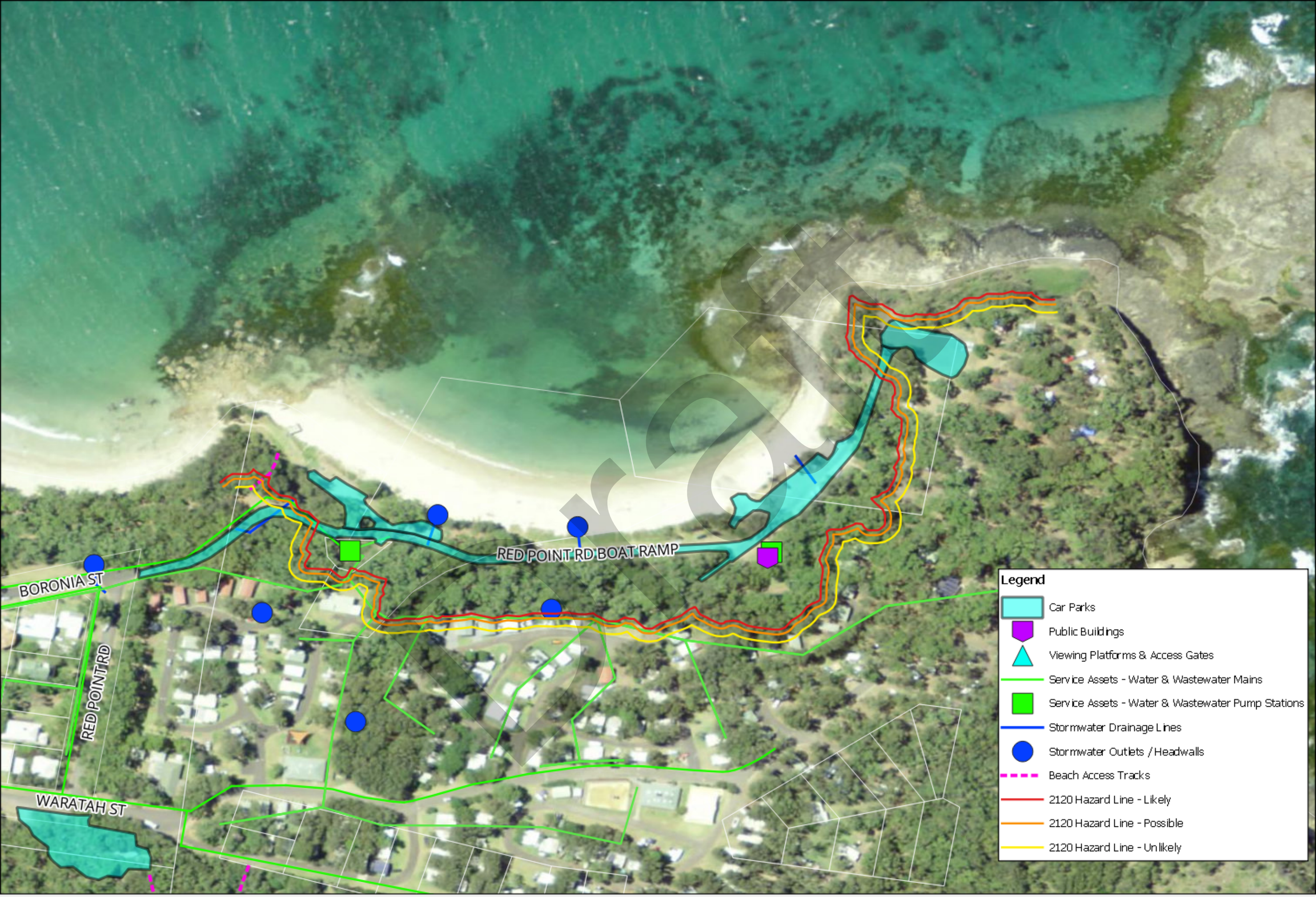
Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 50 100 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Dee Bluff

2023-10-21T17:33:12.221



draft

Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 50 100 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Bendalong

2023-10-22T14:55:34.854

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

CURVERS DR
THE PARAPET
THE CITADEL
THE RAMPART
THE FOREDECK
THE PROMENADE
THE WHEELHOUSE
THE BRIDGE
THE LOOKOUT
SUNSET STRIP
MANYANA DR

Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Manyana

2023-10-22T15:02:50.809



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Narrawallee

2023-10-22T15:06:50.572



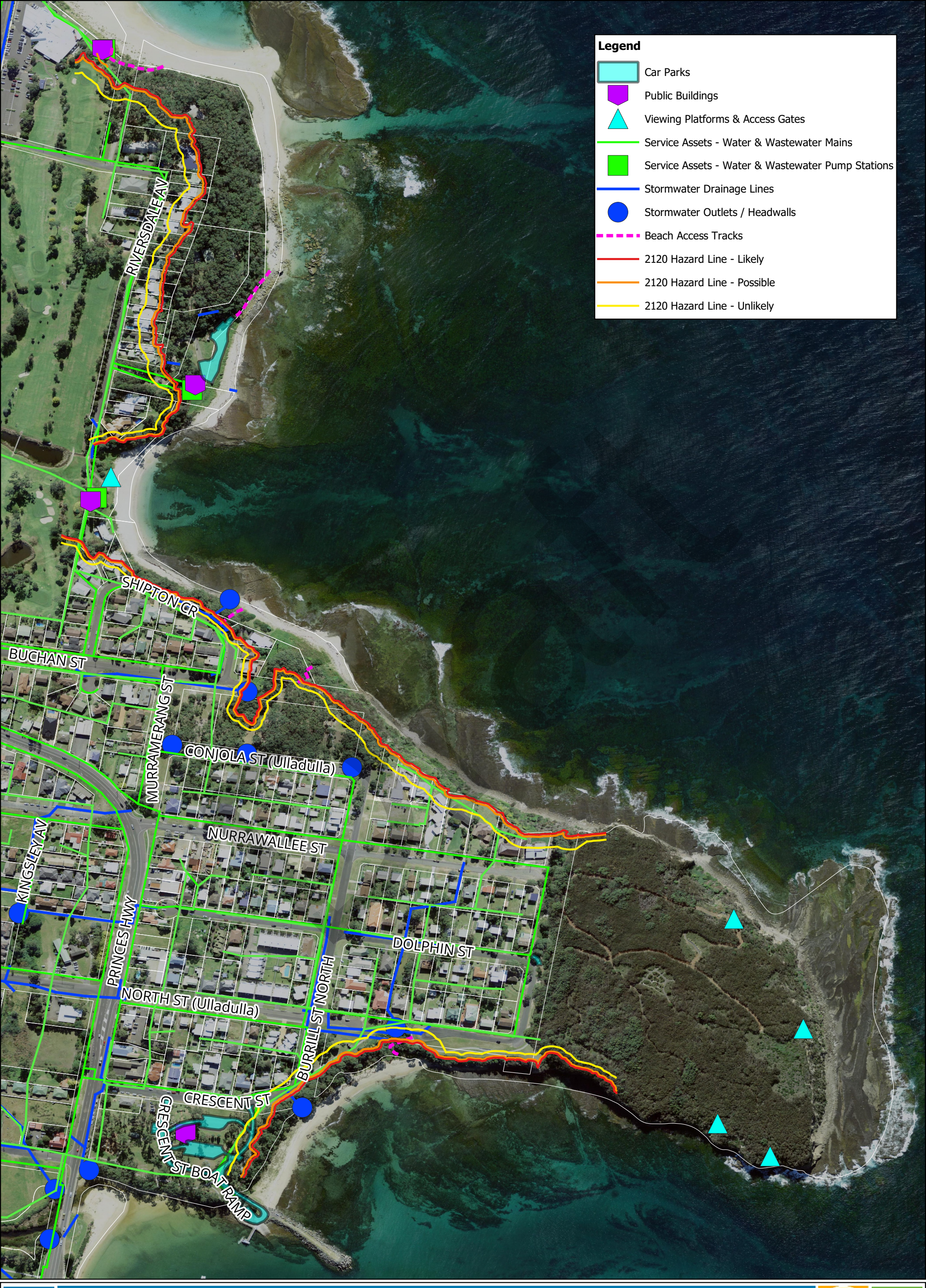
Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Bannisters Headland

2023-10-22T15:09:29.240



Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Collers Bluff

2023-10-22T15:17:57.592



Data sources:

Contains Vicmap Information © State of Victoria 2023

Imagery date:

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Warden Head

2023-10-22T15:22:33.173



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Racecourse Bluff

2023-10-22T15:27:12.478



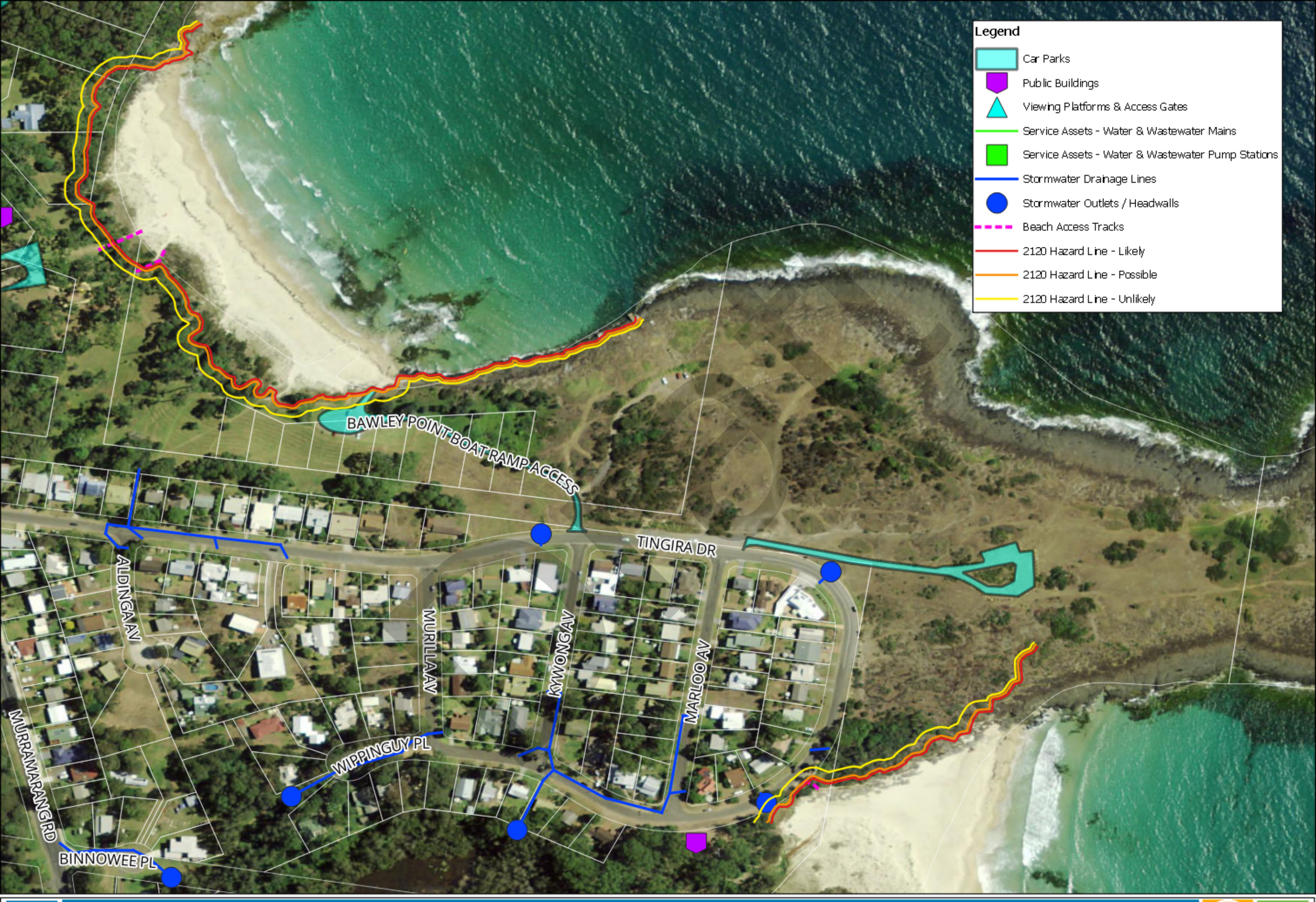
Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 50 100 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Dolphin Point

2023-10-22T15:31:58.245



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Bawley Point

2023-10-22T15:35:51.364

Legend

- Car Parks
- Public Buildings
- Viewing Platforms & Access Gates
- Service Assets - Water & Wastewater Mains
- Service Assets - Water & Wastewater Pump Stations
- Stormwater Drainage Lines
- Stormwater Outlets / Headwalls
- Beach Access Tracks
- 2120 Hazard Line - Likely
- 2120 Hazard Line - Possible
- 2120 Hazard Line - Unlikely

NGTON CR
LURNEA AV
ROSEMARY AV
BEACHGLADE PL
NORTHAVEN AV
SURFTIDE AV
ISLANDER AV
SUNSEEKER DR
MALIBU DR
SANDERLING PL

Data sources:
Contains Vicmap Information © State of Victoria 2023
Imagery date:

0 50 100 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Gannet Beach

2023-10-22T15:41:13.607



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Kioloa

2023-10-22T15:55:49.210



Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 50 100 m

Coastal Cliff and Slope Instability Hazard - CZEAS

Depot Beach

2023-10-22T15:54:44.696



Draft

Data sources:
Contains NSW Sixmaps Information © State of NSW 2023

0 100 200 m

Coastal Cliff and Slope Instability Hazard - CZEAS

North Durras

2023-10-22T15:58:51.207

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

APPENDIX C
OVERVIEW OF NABE

Draft



C-1 Overview of Nature Assisted Beach Enhancement

Nature Assisted Beach Enhancement (NABE) – otherwise referred to as beach scraping, is a technique used for accelerating beach recovery following erosion by changing the slope of a beach, periodically, to allow the energy of the sea to bring additional sand onshore. This is achieved by transferring a small amount of sand from the beach berm at low tide and adding the sand to the dune system. This process serves to assist nature in beach enhancement by systematically accelerating up the natural cross-shore recovery process of the beach profile (Royal HaskoningDHV, 2018). NABE can therefore be used as a measure to aid recovery where beach access has been damaged following a storm and can be combined with the restoration works for the key beach accessways throughout the LGA.

NABE is basically a mechanical intervention to speed up the natural processes of beach and foredune recovery after a storm event. It is a useful tool to achieve rapid re-establishment of a foredune and beach berm. It can not only be used to create a buffer against further back beach erosion during following storms but can also re-establish a dune crest level that will prevent a wash through from wave overtopping. While it is not a panacea for overcoming long-term coastal recession, it can reduce the rate of recession by mitigating the compounding impacts of multiple storm erosion events (Gordon, 2015). The technique has been used successfully at many places, including across the Shoalhaven LGA (see Figure C-1).



Figure C-1 Emergency beach scraping works undertaken by Council after storm events. Left: Bendalong Boat Harbour, April 2022. Right: Mollymook Beach, June 2020. Image source: SCC

It is recognised that the restoration works proposed would not, per se, form a permanent solution to an erosion problem and scraping may need to be done again at some future time. However, such soft engineering techniques are encouraged as they do not interfere significantly with the natural processes and they have minimal adverse impacts on the environment (Gordon, 2015). Beach scraping has higher uncertainty as a protection measure than other coastal management options, so should only be undertaken in conjunction with a comprehensive monitoring program (Carley, et al., 2010).

C-2 Methods

The techniques and methods applied to local NABE activities are summarised in the report Shoalhaven Beach Erosion Recovery and Analysis (Advisian, 2023). However, some general information and considerations are provided herein.

- As part of NABE activities material is bulldozed from the swash zone, starting at low tide, and pushed up onto the berm working up the swash zone as the tide rises – see Figure C-1. The sand harvested from

the swash zone onto the berm can then be moved to the back of the beach during the higher phases of the tide to form the incipient dune (Gordon, 2015).

- It should be noted that working on a beach, and particularly in the swash zone, is a harsh environment for any mechanical equipment and it is often impractical to use anything other than track tread vehicles such as bulldozers and track tread front-end loaders for swash zone work.
- From a practical viewpoint it is often prudent to ensure projects are undertaken using at least two machines. Not only does this speed up production, but it also ensures that there is back up for retrieval if one of the machines becomes bogged. The risk of equipment bog down is significant in the swash zone.
- Carley et al (2010) provide data on the realistic yield of bulldozers indicating that a D6 can move 94 m^3/hr, a D7, 175 m^3/hr and a D9 around 188 m^3/hr.
- In relatively calm wave conditions following storm erosion, it has historically been found that the rate of natural resupply from the offshore region to the swash zone is initially rapid so that typically, a 0.3 m skimming of the swash zone on one tide can result in near reinstatement of the previous swash zone by the next tide (Gordon, 2015).
- Experience dictates that there is no need to fully re-build eroded dunes using NABE. Rather, NABE should be used to commence “kick-start” the natural process and provide early opportunities for re-planting and re-colonisation by remnant vegetation so that the natural sand trapping can take over the dune building process (Gordon, 2015).

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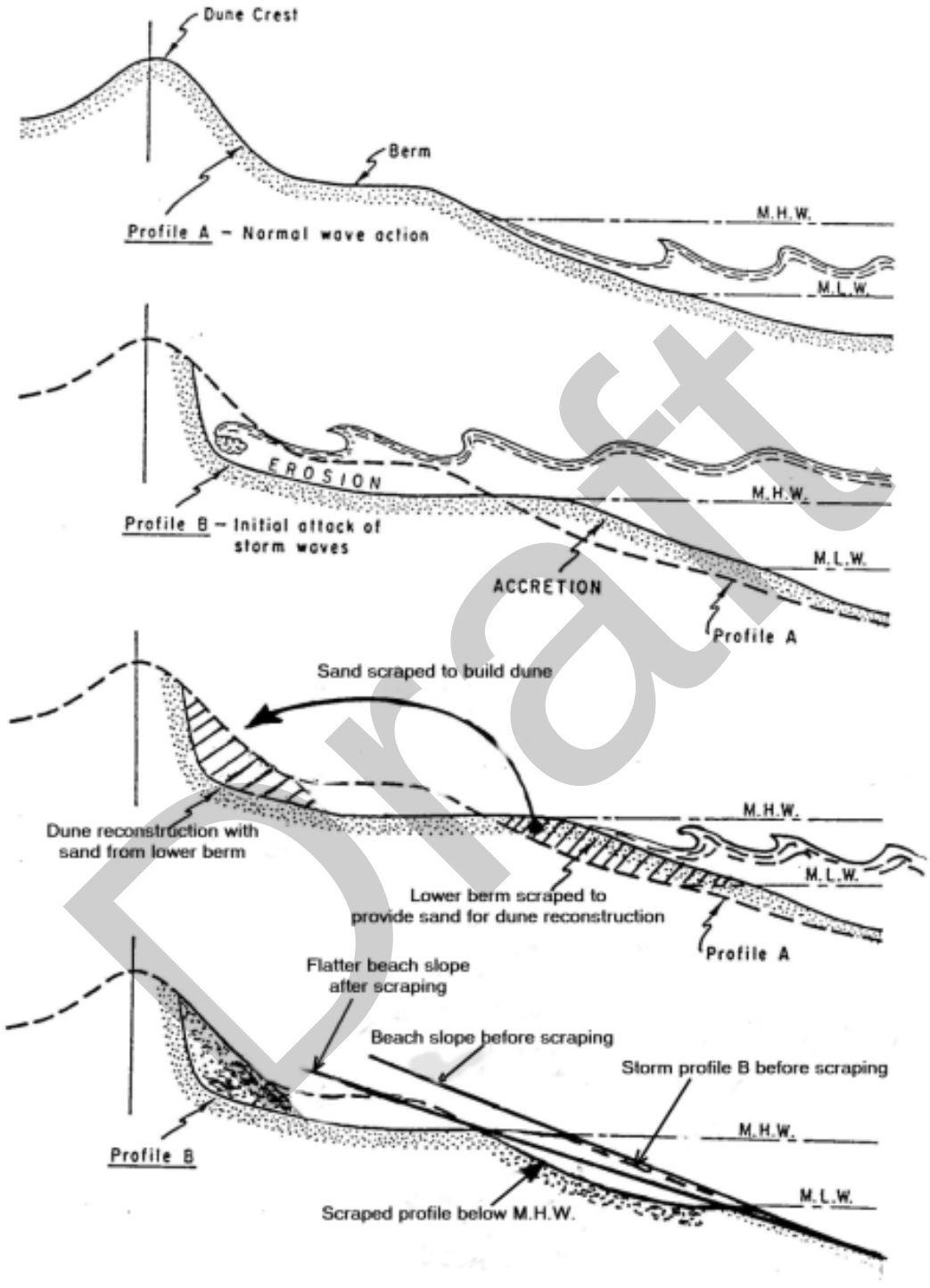

Figure C-2 Schematic diagram illustrating the application of beach scraping (Advisian, 2018b)

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APPENDIX C
GLOSSARY OF TERMS AND ABBREVIATIONS

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Term	Definition
Acceptable risk	A risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk further. Individuals and society can live with this risk without feeling the necessity to reduce risks further. Positive and negative risks are negligible or so small that no risk treatments are needed.
Accretion	As the build-up of sediments to form land or shoaling in coastal waters or waterways. It may be either natural or artificial. Natural accretion is the build-up of land on the beach, dunes, or in the water by natural processes, such as waves, current and wind. Artificial accretion is a similar build-up of land resulting from built structures such as groynes or breakwaters, or activities such as filling and beach nourishment, or also aggradation.
ACH	Aboriginal Cultural Heritage.
Adaptation	Adjustment in natural or human systems in response to actual or expected climate change or its effect, to moderate harm or to take advantage of beneficial opportunities.
AHD	Australian Height Datum (AHD) is the geodetic datum for altitude measurement in Australia. The level of 0.0 m AHD approximately corresponds to mean sea level.
Alongshore or Longshore	Parallel to and near the shoreline.
Ambulatory	In relation to the coastal foreshore, this means the movement of the foreshore seaward or landward over time, in response to coastal processes and sediment budgets. The movement of the foreshore may occur at different rates or in different directions along a beach or within a sediment compartment.
Annual Exceedance Probability (AEP)	The probability (expressed as a percentage) of an exceedance (e.g., large wave height or high water level) in a given year.
Aquatic habitat	Typical submerged communities extending from near sea, river, or lake level down several feet, such as tidal flats, oyster beds, clam flats, seagrass beds, or fishing reefs.
Asset	Something of value and may be environmental, economic, social, recreational or a piece of built infrastructure.
Astronomical tide	Water level variations due to the combined effects of the Earth's rotation, the Moon's orbit around the Earth and the Earth's orbit around the Sun. It excludes and oceanographic or meteorological influences.
Back beach or back shore	The zone of the shore or beach lying between the foreshore and the coastline comprising the berm or berms and acted upon by waves only during severe storms, especially when combined with exceptionally high water.
BCR	Benefit-Cost Ratio.
Beach	The CM Act defines beach as an area that is generally composed of sand or pebbles or similar sediment that extends landward from the lowest astronomical tide to the line of vegetation or bedrock or structure.
Beach erosion	Refers to landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers; wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.

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Term	Definition
Beach nourishment	Beach restoration or augmentation using clean dredged or fill sand. Dredged sand is usually hydraulically pumped and placed directly onto an eroded beach or placed in the littoral transport system. When the sand is dredged in combination with constructing, improving, or maintaining a navigation project, beach nourishment is a form of beneficial use of dredged material.
Beach plan shape	The shape of the beach in plan; usually shown as a contour line, combination of contour lines or recognisable features such as beach crest and/or the still water line.
Beach profile	A cross-section taken perpendicular to a given beach contour; the profile may include the face of a dune or seawall, extend over the backshore, across the foreshore, and seaward underwater into the nearshore zone.
Beach rotation	Beach rotation refers to a natural morphological process whereby the opposing ends of an embayed beach may narrow and widen in opposition to one another in response to seasonal or periodic changes in climate parameters such as wave direction and/or gradients in wave energy.
Beach scraping	Also referred to as 'nature assisted beach enhancement' (NABE) is a mechanical intervention to speed up the natural processes of berm and foredune recovery after a storm event.
Beach system	The CM Act defines as 'the processes that produce the beach fluctuation zone and the incipient foredunes and foredunes landward of the relevant beach'. In general, this means coastal lands, composed of sand, gravel or shell, between a seaward limit of 40 metres depth in the State coastal waters and a landward limit at the lee side of the dunes.
Berm	On a beach, a nearly horizontal plateau on the beach face or backshore, formed by the deposition of beach material by wave action or by means of a mechanical plant as part of a beach renourishment scheme. Some natural beaches have no berm, others have several.
Biodiversity	The variety and variability of wildlife (both plants and animals) and habitats. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level.
Blow out	A depression on the land surface (usually a dune) caused by wind erosion.
Bluff	A high, steep bank or cliff.
BMP	Batemans Marine Park.
BOM	The Australian Bureau of Meteorology.
Breaker zone (or surf zone)	The zone within which waves approaching the coastline commence breaking, typically in water depths of between 5 and 10 metres for ocean coasts, but sometimes in shallower water.
Buffer area	A parcel or strip of land that is designed and designated to permanently remain vegetated in an undisturbed and natural condition to protect an adjacent aquatic or wetland site from upland impacts, to provide habitat for wildlife and to afford limited public access.

Draft

Term	Definition
CBA	Cost-Benefit Analysis (CBA) is a systematic economic evaluation technique used to assess and compare the costs and benefits of a proposed project, policy, or investment. It involves quantifying both the positive outcomes (benefits) and the negative aspects (costs) of a decision to determine if the benefits outweigh the costs. CBA typically assigns monetary values to all relevant factors, allowing decision-makers to make informed choices by comparing the net benefits (benefits minus costs) of different options. The goal of CBA is to maximize societal welfare by ensuring that resources are allocated efficiently and that projects or policies with a positive net benefit are favoured.
CEA	Coastal Environment Area – a mapped area under the RH SEPP.
Cliff	A high, steep face of rock; a precipice.
Climate	The characteristic weather of a region, particularly regarding temperature and precipitation, averaged over some significant interval of time (years).
Climate change	The long-term change (decades or longer) in pattern of weather, and related changes in oceans, land surfaces and ice sheets.
CM Act	*NSW Coastal Management Act 2016.*
CM Manual	The NSW Coastal Management Manual.
CMA	Coastal Management Area - Any one of 4 areas that make up the coastal zone as defined in the CM Act. These are the coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area, and the coastal use area.
CMP	Coastal Management Program – a long-term strategy for the coordinated management of land within the coastal zone, prepared and adopted under Part 3 of the CM Act.
Coast	A strip of land of variable width that extends from the shoreline inland to the first significant landform that is not influenced by coastal processes (such as waves, tides and associated currents).
Coastal dune	Vegetated and unvegetated sand ridges built-up at the back of a beach. They comprise dry beach sand that has been blown landward and trapped by plants or other obstructions. Stable sand dunes act as a buffer against wave damage during storms, protecting the land behind from salt water intrusion, sea spray and strong winds. Coastal dunes also act as a reservoir of sand to replenish and maintain the beach at times of erosion.
Coastal engineering	A branch of civil engineering that applies engineering principles specifically to projects within the coastal zone (nearshore, estuary, marine, and shoreline).
Coastal hazard	Defined in the CM Act to mean the following: ▪ beach erosion ▪ shoreline recession ▪ coastal lake or watercourse entrance instability ▪ coastal inundation ▪ coastal cliff or slope instability ▪ tidal inundation ▪ erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters

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Term	Definition
Coastal inundation	Coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g., dunes, seawalls).
Coastal lake or watercourse entrance instability	Refers to the variety of potential hazards and risks associated with the dynamic nature of both natural and trained entrances. Coastal lake and watercourse entrances are highly active environments with their shape constantly changing in response to processes such as alongshore sediment transport, tidal flows, storms and catchment flooding.
Coastal processes	Marine, physical, meteorological and biological activities that interact with the geology and sediments to produce a particular coastal system.
Coastal protection works	The CM Act defines coastal protection works as: a) beach nourishment b) activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.
Coastal sediment compartment	An area of the coast defined by its sediment flows and landforms. Coastal sediment compartments may be mapped at primary, secondary or tertiary (local) scales. Boundaries are generally defined by structural features related to the geologic frameworks that define the planform of the coast.
Coastal wetland	Wetlands are areas that are inundated cyclically, intermittently or permanently with fresh, brackish or saline water and have soils, plants and animals in them that are adapted to, and depend on, moist conditions for at least part of their lifecycle. Coastal wetlands include marshes, mangroves, swamps, melaleuca forests, casuarina forests, sedgelands, brackish and freshwater swamps and wet meadows.
Coastal zone	As defined in the CM Act and CM SEPP: the area of land comprised of the following coastal management areas: the coastal wetlands and littoral rainforest area, the coastal vulnerability area, the coastal environment area and the coastal use area.
Council	Shoalhaven City Council. SCC as shorthand for figures and tables in this report.
Crown Land	In NSW, crown land refers to land that is owned by the NSW government and managed by various government agencies. In relation to this CMP, crown lands include submerged Crown land, seabed and subsoil to 3 nautical miles from the coastline of NSW that is within the limits of the coastal waters of the State.
CSP	Community Strategic Plan. The CSP forms the overarching, visionary document that translates the community's key priorities and aspirations into long-term strategic goals that guide the future direction of the Shoalhaven LGA. The Plan represents the highest level of strategic planning undertaken by a local council. The CMP must reflect and support implementation of the CSP. Under the CM Act, the objectives and management actions developed as part of CMPs are required to be strategically aligned with the objectives and strategies outlined in the CSP.
CUA	Coastal Use Area – land identified by the CM Act and RH SEPP as being land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (now or in the future). The RH SEPP maps the extent of the coastal use area for planning purposes.
CVA	Coastal Vulnerability Area – defined in the CM Act as land subject to 7 coastal hazards.
CWLR	Coastal Wetland and Littoral Rainforests – a mapped area under the RH SEPP.

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Term	Definition
CZEAS	A coastal zone emergency action subplan – Defined in the CM Act as plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event.
CZMP	Coastal Zone Management Plan – a plan for managing the coastal zone developed under the old (now superseded) coastal management framework for NSW. Now replaced by CMPs.
Design storm	A hypothetical extreme storm with waves that coastal protection structures will often be designed to withstand. The severity of the storm (i.e., return period) is chosen in view of the acceptable level of risk of damage or failure. A design storm consists of a design wave condition, a design water level, and a duration.
DP	Deliver Programs. The Delivery Program is a 4 year program that translates the strategic objectives of the Community Strategic Plan into actions. It is a fixed 4 year program, which is a statement of commitment from each newly elected Council. It identifies all key activities a council has committed to undertake over its 4 year life cycle.
DPI	NSW Department of Primary Industries.
DPE	The NSW Department of Planning and Environment.
East Coast Low (ECL)	An intense low-pressure system that occurs off the east coast of Australia, bringing storms, high waves and heavy rain. East coast lows generally occur in autumn and winter off NSW, southern Queensland, and eastern Victoria.
Economic evaluation	An assessment that helps decision-makers to understand the socioeconomic implications of adopting alternative management options and to make choices that will provide net benefits to the community. Cost-benefit analysis is a type of economic evaluation that considers and evaluates a wide range of costs and benefits associated with a proposal, in qualitative or quantitative (monetary) terms (with future costs and benefits reduced to today's prices), compared with a base case. It may be used in conjunction with other criteria (such as technical feasibility, community acceptance or environmental impact) to select optimal management responses. A multi-criteria assessment is not an economic evaluation but may assist decision-making in other ways.
Ecosystem	The living organisms and the non-living environment interacting in an area, encompassing the relationships between biological, geochemical, and geophysical systems; or a community and its environment including living and non-living components.
ENSO	The El Niño Southern Oscillation. ENSO is a climate phenomenon characterized by the periodic variation in sea surface temperatures and atmospheric pressure patterns across the tropical Pacific Ocean. It consists of two main phases: ▪ El Niño: During El Niño events, warmer-than-average sea surface temperatures in the central and eastern tropical Pacific Ocean lead to alterations in global weather patterns. This can result in various impacts, such as droughts, floods, and extreme weather events in different parts of the world. ▪ La Niña: In contrast, La Niña events involve cooler-than-average sea surface temperatures in the same region. This typically leads to opposite weather patterns, including increased rainfall in some regions and more intense tropical cyclones.
Entrance management	Includes artificial opening of entrances, managing the configuration, height or location of the beach berm to facilitate entrance opening at a level lower than the natural range.

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Term	Definition
EP&A Act	The NSW Environmental Planning and Assessment Act - An act that governs land use planning and development in NSW, focusing on sustainable development, environmental protection, community participation, and compliance measures.
EPW	Environmental Protection Works.
Erosion	The removal of land by natural forces such as waves, tidal currents and / or littoral currents.
Essential infrastructure	The CM Act defines infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rail, roads, gas, sewerage systems, water supply systems or stormwater management systems, airports, ports shipping and harbours.
Estuary	The CM Act defines as any part of a river, lake, lagoon, or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide.
Extreme storm event	The storm for which characteristics (wave height, period, water level etc.) were derived by statistical 'extreme value' analysis. Typically, these are storms with average recurrence intervals (ARI) ranging from one to 100 years.
Fit for purpose	Right for the job it is intended to do. A fit for purpose assessment considers the level of data detail and the types of consultation required to make a reasonable management decision. In general, the detail and consultation required will increase with risk, complexity and impact.
Flood tide delta	Deposit of marine sediment (usually sand) within a coastal embayment that has formed at the landward side of a tidal inlet by rising (or flood) tidal currents and wave action.
Foredune	The larger and more mature dune lying between the incipient dune and the hind dune area. Foredune vegetation is characterised by grasses and shrubs. Foredunes provide an essential reserve of sand to meet the erosion demand during storm conditions. During storm events, the foredune can be eroded back to produce a pronounced dune scarp.
Foreshore	The part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall; or the beach face, the portion of the shore extending from the low water line up to the limit of wave uprush at high tide. The CM Act defines the foreshore as 'the area of land between highest astronomical tide and the lowest astronomical tide'.
Geomorphology	A branch of physical geography encompassing the formation of the earth's surface, including the distribution of land and water.
Geotechnical investigations	Subsurface investigation of soils, rock, and other strata for the purposes of engineering design.
Groyne	A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore; or a narrow, roughly shore normal structure built to reduce longshore currents, and/or to trap and retain littoral material. Most groynes are of timber or rock and extend from a seawall, or the backshore, well onto the foreshore and rarely even further offshore.
GSC	Geotextile Sand Container. A sand filled container made out of a synthetic geotextile synthetic fabric which may be woven or non–woven.
HHWSS	High High Water Solstice Springs. The HHWSS tidal plane was originally defined as the level beyond which tides seldom reach. It is consistent with predicted levels for higher (king) tides but is slightly lower than highest astronomical tide (HAT).

Term	Definition
Hydrodynamic	Relates to the specific scientific principles that deal with the motion of fluids and the forces acting on solid bodies immersed in fluids, and in motion relative to them.
IAP2	International Association for Public Participation.
ICOLL	Intermittently Closed and Open Lakes and Lagoons. Coastal lakes and lagoons where the entrance may be closed to the sea from time to time and for varying periods, by accretion of a berm. ICOLLs have sensitive water quality because they accumulate loads of sediment and nutrients from the catchment and may have poor water circulation and flushing. The most sensitive waterways listed in the CM SEPP are all ICOLLs. The catchments of these lakes and lagoons are included in the coastal environment area.
Impacts	Include damage, harm or losses to exposed communities, property, services, livelihoods, access, use and amenity, heritage, ecosystems and the environment because of exposure and sensitivity. Impacts may also be positive.
Incipient dune	The most seaward and immature dune of the dune system. Vegetation characterised by grasses such as spinifex. On an accreting coastline, the incipient dune will develop into a foredune.
Intertidal zone	The region of the foreshore that is above the water at LAT but submerged at HAT.
IPCC	Intergovernmental Panel on Climate Change. A scientific and intergovernmental body under the auspices of the United Nations, set up at the request of member governments, dedicated to the task of providing the world with an objective, scientific view of climate change and its political and economic impacts.
IP&R	NSW Integrated Planning and Reporting Framework.
JBMP	Jervis Bay Marine Park.
King tides	Any high water level that is well above the average, commonly applied to two spring tides that are the highest for the year, one during summer and one in winter.
LALC	A Local Aboriginal Land Council (LALC) in New South Wales, Australia, is a statutory body established under the New South Wales Aboriginal Land Rights Act 1983. These councils are created to represent the interests and needs of the local Aboriginal communities within their respective areas. The primary purpose of Local Aboriginal Land Councils is to acquire, hold, and manage land on behalf of the Aboriginal people in their local areas.
LAP	Local Area Plan – sub-plans of this CMP that pertain to particular geographic areas.
LEP	Local Environmental Plan.
LG Act	*The Local Government Act 1993*
LGA	Local Government Area.
Littoral	Of or pertaining to a shore, especially of the sea. Often used as a general term for the coastal zone influenced by wave action, or, more specifically, the shore zone between the high and low water marks.
Littoral rainforest	A closed forest ecological community recognised by its close proximity to the ocean (generally <2km) and closed canopy (i.e., ~70% of the sky obscured by tree leaves and limbs). Listed as an endangered ecological community under the NSW Biodiversity Conservation Act 2016. Littoral rainforest areas are mapped with coastal wetlands in the RH SEPP, to form the coastal wetlands and littoral rainforests management area. Development controls apply to the management area and a proximity area which is also mapped.

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Term	Definition
LLS	NSW Local Land Services – a stage government agency within the Department of Regional NSW.
Longshore transport (littoral drift)	Refers to the sediment moved along a coastline under the action of wave-induced longshore currents (Dean and Dalrymple, 2002). The net drift is the sum of the positive (conventionally northwards direction in NSW) and negative (southwards in NSW) direction. The gross drift is the sum of the drift magnitudes (absolute values). The differential drift is the difference between the net drift into and out of a coastal compartment. Both gross and net drift are typically averaged over a year and expressed in m3/yr.
Marine estate	The Marine Estate Management Act 2014 defines it as: (a) the coastal waters of the State within the meaning of Part 10 of the Interpretation Act 1987, (b) estuaries (being any part of a river whose level is periodically or intermittently affected by coastal tides) up to the highest astronomical tide, (c) lakes, lagoons and other partially enclosed bodies of water that are permanently, periodically or intermittently open to the sea, (d) coastal wetlands (including saltmarsh, mangroves and seagrass), (e) lands immediately adjacent to, or in the immediate proximity of, the coastal waters of the State that are subject to oceanic processes (including beaches, dunes, headlands and rock platforms), (f) any other place or thing declared by the regulations to be the marine estate, but does not include any place or thing declared by the regulations not to be the marine estate.
MCA	Multi-criteria analysis. A decision-making methodology used to evaluate and compare multiple options or alternatives based on a set of diverse and often conflicting criteria. It enables a systematic approach to complex decision processes by assigning weights to these criteria to reflect their relative importance. MCA helps decision-makers assess the trade-offs and make informed choices, considering a variety of factors, such as cost, environmental impact, social implications, and more. This method assists in addressing decisions that involve multiple objectives, enabling a structured and transparent evaluation process that supports rational and well-informed decision-making.
MEMA	Marine Estate Management Authority.
MEMS	Marine Estate Management Strategy.
MER	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.
MHL	Manly Hydraulics Laboratory.
MHW	Mean high water mark – the line of the medium high tide between the highest tide each lunar month (the springs) and the lowest tide each lunar month (the neap) averaged over out over the year. In NSW, the methods for determining the position of the MHWM are outlined in the Crown Directions to Surveyors - No. 6 Water as a Boundary.

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Term	Definition
MIDO	The Maritime Infrastructure Delivery Office (MIDO) sits within Maritime and is a joint initiative between the former agencies of Roads and Maritime Services and the Department of Industry to improve the coordination and delivery of coastal and boating infrastructure programs and projects across NSW that support recreational boating, fishing, tourism and a range of other commercial activities. MIDO is responsible for delivering key projects and programs including TfNSW's Boating Now Program, and DPE's Coastal Infrastructure Program.
MSL	Mean Sea Level. The mean level of the sea over a long period (preferably 18.6 years) or the mean level which would exist in the absence of tides.
Multi-criteria analysis	A logical and structured decision-making tool for complex problems involving multiple factors or criteria, where a consensus is difficult to achieve. It may involve processes such as ranking, rating (with relative or ordinal scales) or pairwise comparisons. The process allows participants to consider, discuss and test complex trade-offs among alternatives.
Natural character	Includes all-natural aspects of the land and sea, including the underlying ecological, hydrological and geomorphological processes that shape landforms (including underwater features) and the natural movements of water and sediment. Natural character also includes aspects of the environment that affect human experience including the natural darkness of the night sky, the sounds and smell of the coast, and the context and setting of natural places.
Near shore	The area of ocean close to the coast that is affected by waves, tides and longshore currents.
No or low regrets actions	Options which would be justified under any plausible future scenario (i.e., they are best practice in any circumstance), and similarly, actions which require only moderate investment to achieve a beneficial outcome.
NPV	Net Present Value, the difference between the present value of cash inflows and the present value of cash outflows over a period of time.
NPWS	The NSW National Parks and Wildlife Service.
NSW	New South Wales.
NSW Coastal Council	Established under Part 4 of the CM Act. A group of 3 to 7 coastal experts, appointed by the Minister to provide advice on coastal management issues.
OEH	The former Office of Environment and Heritage – now the Department of Planning and Environment (DPE).
Outflanking or end effects	Erosion behind or around the land-based end of a groyne, jetty or breakwater or the terminus of a revetment or seawall, usually causing failure of the structure or its function.
Overwash	The part of the wave uprush that runs over the crest of a berm or structure and does not flow directly back to the ocean or lake. When waves overtop a coastal protection structure, they often carry sediment landwards, which is then lost to the beach system. Also defines a process in which waves penetrate inland of the beach, which is common on low barriers.
Progradation	The building forward or outward toward the sea of a shoreline or coastline (as with a beach, delta, or fan) by nearshore deposition of river-borne sediments or by continuous accumulation of beach material thrown up by waves or moved by longshore drifting.

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Term	Definition
Public Authority	Defined in the CM Act as a Minister of the Crown of the State, a State owned corporation, an electricity supply authority, a department or instrumentality of the State, a local council and any other public or local authority constituted by or under any Act and includes any prescribed body.
Recession	A continuing landward movement of the shoreline; or a net landward movement of the shoreline over a specified time.
Resilience	The ability of a system (human or natural) to adapt to changing conditions (including hazards or threats, variability, and extremes), and rapidly recover from disruption due to emergencies. Resilient systems or communities have the capacity to 'bounce back' after a disrupting event such as a major storm or an extended heat wave, to moderate potential damages, take advantage of opportunities, maintain, or restore function or to cope with the consequences.
Revetment or seawall	A type of coastal protection work which protects assets from coastal erosion by armouring the shore with erosion–resistant material. Large rocks/boulders, concrete or other hard materials are used, depending on the specific design requirements.
RH SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood.
SCC	Shoalhaven City Council.
Sea level rise	An increase in the mean level of the oceans. Relative sea level occurs where there is a local increase in the level of the ocean relative to the land, which might be caused by ocean rising, the land subsiding, or both. In areas with rapid land level uplift (e.g., seismically active areas), relative sea level can fall.
Sediment transport	The process whereby sediment is moved offshore, onshore or along shore by wave, current or wind action.
Sediment Compartment	A sediment compartment is an area in which coastal processes, and their effects on the geology of the coast, are broadly homogeneous. 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.
SEPP	State Environmental Planning Policy.
Shoreline recession	Refers to continuing landward movement of the shoreline, that is, a net landward movement of the shoreline, generally assessed over a period of several years. As shoreline recession occurs the beach fluctuation zone is translated landward.
Significant wave height (Hs)	Due to the random nature and size of waves, the term "significant wave height" is used by engineers and scientists to quantify wave heights in a sea state. It represents the average of all the third highest waves that occur over a particular timeframe. It is typically written as Hs. It is important to appreciate that in deep offshore waters the largest individual wave in the sea state may be around twice the significant wave height
Stakeholder	A person or organisation with an interest or concern in something.
Storm demand	Storm demand is the volume of beach sand eroded from the subaerial (visible) part of the beach and dunes during a storm. Typically, it has been defined as the volume of eroded sand as measured above mean sea level (~ 0 m AHD datum).

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Term	Definition
Storm surge	The increase in coastal water levels caused by the barometric and wind set-up effects of storms. Barometric set-up refers to the increase in coastal water levels associated with the lower atmospheric pressures characteristic of storms. Wind set-up refers to the increase in coastal water levels caused by an onshore wind driving water shorewards and piling it up against the coast.
Storm tides	The total observed sea level during a storm, which is the combination of storm surge and normal astronomical tide.
Storm tide inundation	Flooding of coastal land due to inundation from storm tides. Inundation generally persists for the duration of a high tide, though it may persist longer in extreme cases.
Subaerial	On the earth's surface, not underwater or underground.
TfNSW	Transport for NSW.
Tidal currents	Currents caused by the incoming (ebb) or outgoing (flood) tide (see Tide). Tidal currents are typically the main current within estuaries, particularly in the entrance area where tidal currents transport marine sediments (sand).
Tidal inundation	The inundation of land by tidal action under average meteorological conditions and the incursion of sea water onto low lying land that is not normally inundated, during a high sea level event such as a king tide or due to longer-term sea level rise. Sometimes referred to as "sunny day flooding".
Tide	The periodic rise and fall of the water of oceans, seas, bays, etc., caused mainly by the gravitational interactions between the Earth, Moon and Sun.
Tolerable risk	A risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believe that as much as is reasonably practical should be done to reduce the risks further. Note that individuals may find this risk unacceptable and choose to take their own steps, within reason, to make this risk acceptable. Residual risks are considered tolerable only if risk reduction is impractical.
Trigger	Pre-negotiated decision-making points and commitments, so that action on coastal risks is taken when necessary, and when it is most convenient and affordable for the affected community.
Vulnerability	A function of exposure and sensitivity of assets to a hazard, which determines the potential impacts of the hazard. For instance, the vulnerability of coastal assets may be influenced by the extent and impact of environmental, social and economic factors such as saline contamination of soils from flooding, erosion of built-up and natural areas, loss of vegetation, disruption to use, or access, or continuity of service, or loss of amenity, corrosion of built structures, undermining of foundations or damage to contents. Vulnerability also considers the adaptive capacity which is the capacity to adapt or the resilience in the system to manage the impacts and changes.
Wave climate	The seasonal and annual distribution of wave height, period and direction.
Wave energy	The capacity of waves to do work. The energy of a wave system is theoretically proportional to the square of the wave height; a high–energy coast is characterised by breaker heights greater than 50 centimetres and a low–energy coast is characterised by breaker heights less than 10 centimetres. Most of the wave energy along equilibrium beaches is used in shoaling and in sand movement. The NSW coast is a high wave energy coast.
Wave Height (H)	The vertical difference between the elevation of a wave crest and a neighbouring trough.

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Term	Definition
Wave Length (L)	The horizontal distance between two wave crests.
Wave Period (T)	The time it takes for two successive wave crests to pass a given point.
Wave run-up	The vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.
Wave set-up	The rise in the water level above the still water level when a wave reaches the coast. It can be very important during storm events as it results in further increases in water level above the tide and surge levels.
WRL	The University of NSW Water Research Laboratory.
Zone of reduced foundation capacity (ZRFC)	A Zone of Reduced Foundation Capacity (ZRFC) for building foundations is delineated to take account of the reduced bearing capacity of the sand adjacent to the storm erosion escarpment. Nielsen et al (1992) recommended that structural loads should only be transmitted to soil foundations outside of this zone (i.e., landward, or below), as the factor of safety within the zone is less than 1.5 during extreme scour conditions at the face of the escarpment.
Zone of slope adjustment (ZSA)	The area landward of an escarpment cut by storm bite, which may be affected by slumping to the angle of repose of the sand as it dries.

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APPENDIX D
ALIGNMENT OF CMP WITH OBJECTIVES OF THE CM ACT AND RH SEPP

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Table D-1 Objects of the CM Act and how they have been addressed in this CMP

CM Act Objects	How this is addressed in this 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	Stage 2 included a detailed study of the various threats to physical coastal processes and environmental values of the study area (Water Technology, 2023a) – this is discussed in Section 2. Stage 3 of the CMP process involved the development of management actions to address the risks and issues identified in Stage 2 (Water Technology, 2023b). Management options were identified that address the threats to the natural coastal processes and environmental values of the coastal zone. These actions were then assessed and prioritised using key criteria that included their efficacy in terms of the protection of these values. More information is provided in Section 4.
b. to support the social and cultural values of the coastal zone and maintain public access and recreational amenity	Stage 2 included a detailed study of the various threats to social and cultural values of the study area (Water Technology, 2023a) – this is discussed in Section 2. Key issues included coastal hazards, and the resulting loss of safe access and recreational amenity. Stage 3 of the CMP process involved the development of management actions to address the risks and issues identified in Stage 2 (Water Technology, 2023b). Management options were identified that address the threats to the social and environmental values of the coastal zone. These actions were then assessed and prioritised using key criteria that included their efficacy in terms of the protection of these values. More information is provided in Section 4.
c. to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone	Extensive engagement with Traditional Owners has been undertaken as part of the preparation of this CMP – as described in Section 3. Through this engagement the CMP has identified the threats and risks to ACH values (see Section 2) and developed specific management actions aimed at protection of ACH and increasing the participation of local First Nations groups in coastal zone management.
d. to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies	The Stage 1 Scoping Study of this CMP provided an overview of the economic value of the coastal zone, and this information is reiterated in the Business Case (see Section 6). Management options were identified that address the threats to the economic value of the coastal zone (including coastal hazards, and the loss of social and recreational amenity). These actions were then assessed and prioritised using key criteria that included their efficacy in terms of the protection of these values. More information is provided in Section 4.
e. to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making	Stage 2 included a detailed study of the various threats to environmental and ecological values of the study area (Water Technology, 2023a) – this is discussed in Section 2. Some notable issues included the impacts of coastal development on local environmental values (such as loss of habitat, vegetation vandalism, and other issues related to urbanisation and population growth). Numerous actions are related to maintaining sustainable planning controls that appropriately manage development in the dynamic coastal zone. These actions were then assessed and prioritised using key criteria that included their efficacy in terms of the protection of these values. More information is provided in Section 4.
f. to mitigate current and future risks from coastal hazards, taking into account the effects of climate change	The extent of current and future coastal hazards - and the associated risks – were assessed in detail in Stage 2 of the CMP and summarised in Section 2). Numerous options were developed with the aim to mitigate the impacts of coastal hazards on the study area. More information is provided in Section 4.
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	Local and regional coastal processes were assessed in detail in Stage 2 of the CMP (summarised in Section 2). Numerous actions related to maintaining sustainable planning controls to appropriately managed development in the dynamic coastal zone, with recognition of the local and regional scale effects of coastal processes. More information is provided in Section 4.

CM Act Objects	How this is addressed in this CMP
h. to promote integrated and co-ordinated coastal planning, management and reporting	The CMP includes a range of actions aimed at facilitating integrated coastal zone planning. More information is provided in Section 4. The CMP also sets out a clear MER framework 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. The proposed MER program has followed the structure of a "Program Logic Model", that describes how the program is intended to work by linking activities with outputs, intermediate impacts, and longer-term outcomes. The program logic model supports a systematic and integrated approach to CMP planning, implementation, and evaluation.
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 includes a range of actions aimed at improving the resilience of coastal assets and infrastructure. More information is provided in Section 4. These actions have been developed based on a thorough review of coastal hazard risks, and associated impacts of assets and infrastructure (Water Technology, 2023a) – this is discussed in Section 2. Future hazard projects have included a range of future SLR scenarios that account for future uncertainty associated with climate change and the response of coastal systems.
j. to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities	This CMP has included a robust program of engagement with a range of public authorities - including relevant state government agencies, and adjacent local government stakeholders with whom Council shares a coastal sediment compartment boundary. A key outcome of this CMP includes numerous actions intended to assist Council in engaging effectively with relevant stakeholders in order to facilitate a more integrated approach to coastal management.
k. to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions	During Stage 1 of the CMP, a comprehensive Stakeholder and Community Engagement Strategy was developed (Advisian, 2020). This outlined the timing, content, and engagement methods to be utilised during Stages 2 to 4 of the CMP. The strategy was developed in accordance with CMP Engagement Guidelines (OEH, 2018), the Shoalhaven City Council Community Engagement Policy and the use of the International Association for Public Participation (IAP2) guidelines. This strategy has been implemented through the development of the CMP, which has involved a robust regime of stakeholder and community engagement integrated through all stages. A summary of the engagement process for the CMP is described in Section 3.
l. to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone	Whilst there are no actions in this CMP with the explicit intention to purchase private properties - the CMP has included a range of actions intended to promote the protection, enhancement, maintenance, and restoration of the environment of the coastal zone. This includes numerous actions related to dune restoration work.
m. to support the objects of the Marine Estate Management Act 2014; and	Stage 2 of this CMP identified a range of threats and risks to the study area, including the NSW Marine Estate Threat and Risk Assessment (TARA) (BMT WBM, 2017) – and included strong consideration of stressors identified in the TARA as high priority stressors for the south coast of NSW. This is described in Section 2. The CMP supports the objectives of the MEM Act by identifying and implementing actions that address these high priority stressors – both in the present day and over future planning horizons.

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Table D-2 Objects of the CM Act for the various CMAs, and how they have been addressed in this CMP

CMA Objectives	How this is addressed in this CMP
Coastal Wetlands and Littoral Rainforests	
(a) to protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity,	Potential risks to the coastal wetlands and littoral rainforests across the CMP study area have been identified and assessed in Stage 2 (Water Technology, 2023a). The identification and design of management actions in Stage 3 and 4 are cognisant of the need to protect coastal wetlands and littoral rainforests in their natural state and to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change. Actions that may have a potential impacts on these areas were assessed as such and did not proceed to Stage 4 (Water Technology, 2023b).
(b) to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests,	
(c) to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration,	
(d) to support the social and cultural values of coastal wetlands and littoral rainforests,	
(e) to promote the objectives of State policies and programs for wetlands or littoral rainforest management	
Coastal Vulnerability Area	
(a) to ensure public safety and prevent risks to human life,	A detailed risk assessment of coastal hazard risks to public and private assets and infrastructure was undertaken in Stage 2 of the CMP (Water Technology, 2023a). This included associated risks to public safety. Subsequently, in Stage 3, actions were developed and prioritised in terms of their ability to mitigate these risks – whilst also considering social, environmental and cultural values (Water Technology, 2023b).
(b) to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change	
(c) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place	Numerous actions relate to beach restoration and dune restoration works – in order to conserve beaches, dunes and the natural features of foreshores.
(d) to maintain public access, amenity and use of beaches and foreshores,	Numerous actions relate to maintenance and upgrade of beach access tracks in order to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.
(e) to encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions	Several actions relate to maintaining and enforcing planning controls to encourage land use that reduces exposure to risks from coastal hazards and ensures ecologically sustainable development.
(f) to adopt coastal management strategies that reduce exposure to coastal hazards (i) in the first instance and wherever possible, by restoring or enhancing natural defences including coastal dunes, vegetation and wetlands, and (ii) if that is not sufficient, by taking other action to reduce exposure to those coastal hazards,	Numerous actions relate to beach restoration and dune restoration works – in order to presence of beaches, dunes and the natural features of foreshores. All potential options in Stage 3 were assessed, not just on their ability to provide coastal hazard protection, but their impact on the coastal environment, public safety, social and recreational amenity (Water Technology, 2023b) As a result, this CMP champions the use of "nature-based solutions", and numerous actions relate to beach restoration and dune restoration works – in order to presence of beaches, dunes and the natural features of foreshores.
(g) if taking that other action to reduce exposure to coastal hazards— (i) to avoid significant degradation of biological diversity and ecosystem integrity, and (ii) to avoid significant degradation of or disruption to ecological, biophysical, geological and geomorphological coastal processes, and	

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CMA Objectives	How this is addressed in this CMP
(iii) to avoid significant degradation of or disruption to beach and foreshore amenity and social and cultural values, and (iv) to avoid adverse impacts on adjoining land, resources or assets, and (v) to provide for the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by actions to reduce exposure to coastal hazards,	
(h) to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency	Stage 2 of the CMP specifically investigated coastal hazard risks to essential infrastructure including roads, wastewater assets, major infrastructure (Water Technology, 2023a). In Stage 3, actions were developed specifically to address these risks.
(i) to improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.	
Coastal Environment Area	
(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,	The various threats to the environmental, social and cultural values of the study area were assessed in detail in Stage 2 (Water Technology, 2023a). These values and their associated threats were considered in the development and assessment of management actions in Stage 3 (Water Technology, 2023b). Numerous actions relate to beach restoration and dune restoration works – in order to presence of beaches, dunes and the natural features of foreshores. Numerous actions relate to maintenance and upgrade of beach access tracks in order to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.
(b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change,	
(c) to maintain and improve water quality and estuary health,	
(d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons,	
(e) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place,	
(f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms	
Coastal Use Area	
(a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that— (i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and (ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and (iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and (iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and (v) the use of the surf zone is considered	The various threats to the social and cultural values of the study area were assessed in detail in Stage 2 (Water Technology, 2023a). These values and their associated threats were considered in the development and assessment of management actions in Stage 3 (Water Technology, 2023b). All potential options in Stage 3 were assessed, not just on their ability to provide coastal hazard protection, but not their impact on the coastal environment, public safety, social and recreational amenity (Water Technology, 2023b).
(b) to accommodate both urbanised and natural stretches of coastline	

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APPENDIX E
BEACH ACCESS TRACK ACTION MAPS

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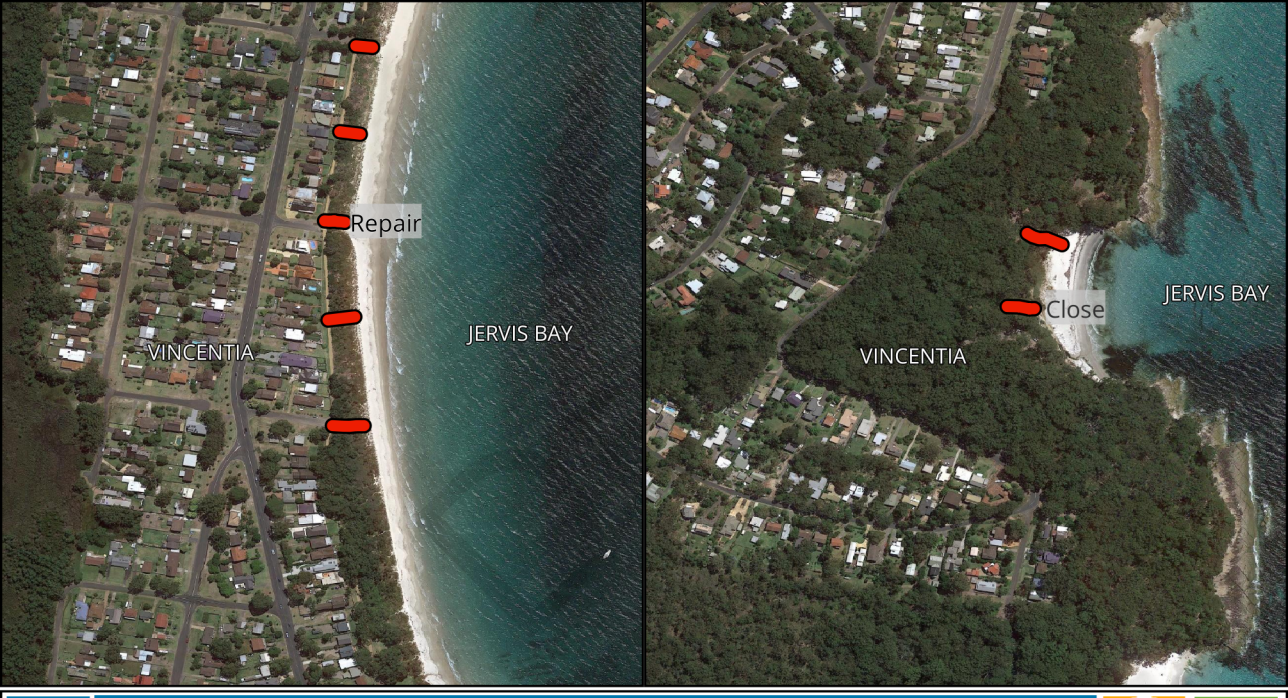
Shoalhaven Open Coast and Jervis Bay CMP

Callala Bay and Callala Beach Access Tracks

2023-11-13T13:20:55.893



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Shoalhaven Open Coast and Jervis Bay CMP

Collingwood Beach and Blenheim Beach Access Tracks

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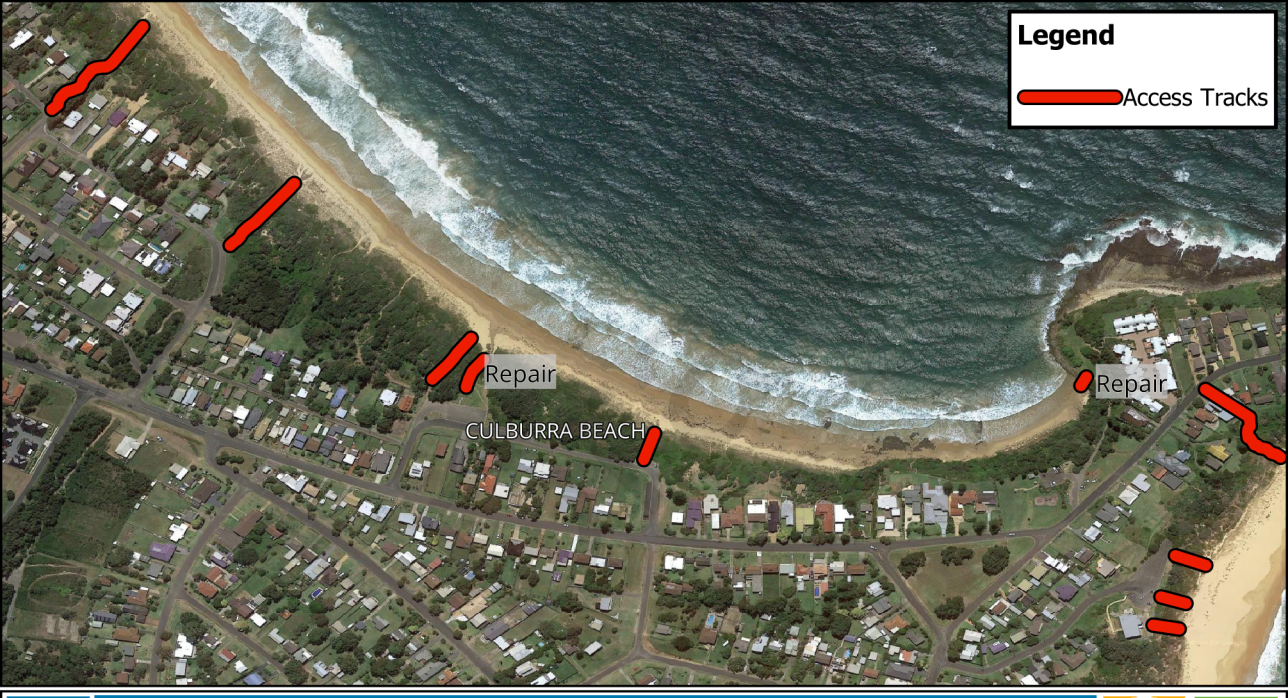

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Shoalhaven Open Coast and Jervis Bay CMP

Culburra Beach Access Tracks

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Shoalhaven Open Coast and Jervis Bay CMP

Cunjurong Pt and Manyana Beach Access Tracks

2023-11-13T13:57:38.824



Shoalhaven Open Coast and Jervis Bay CMP

Currarong Beach Access Tracks

2023-11-25T10:18:41.042



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Shoalhaven Open Coast and Jervis Bay CMP

Gannet Beach Access Tracks

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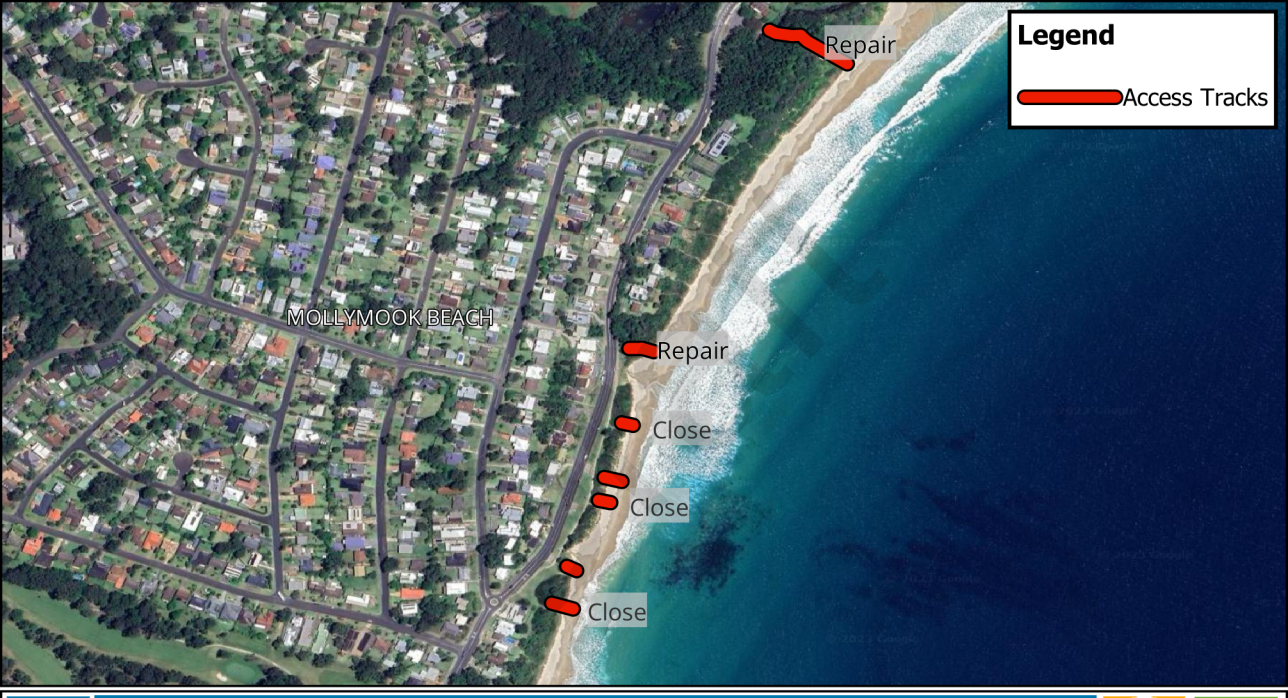

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Shoalhaven Open Coast and Jervis Bay CMP

Mollymook Beach Access Tracks

2023-11-13T13:44:38.708



Shoalhaven Open Coast and Jervis Bay CMP

Wairo Beach Access Tracks

2023-11-13T13:46:48.510

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