Port Stephens Coastal Management Program

CMP Stage 3 Report

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Acknowledgements

Acknowledgement of Traditional Owners

We acknowledge the Worimi as the original Custodians and inhabitants of Port Stephens.

May we walk the road to tomorrow with mutual respect and admiration as we care for the beautiful land and waterways together.

Acknowledgement of Financial Assistance

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Glossary and Abbreviations[1]

Abbreviation / Term	Term
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.
Aeolian sand transport	The erosion, transport and deposition of sand by the action of wind.
Average Recurrence Interval (ARI)	The Average Recurrence Interval (ARI) refers to the long-term average number of years between the occurrence of an event (e.g. a coastal storm) as big as (or larger than) the selected event. ARI is another way of expressing the likelihood of occurrence of a storm event Also known as Return Period.
Beach erosion	Refers to landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers; wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.
Beach nourishment	Beach restoration or augmentation using clean dredged or fill sand. Dredged sand is usually hydraulically pumped and placed directly onto an eroded beach or placed in the littoral transport system. When the sand is dredged in combination with constructing, improving, or maintaining a navigation project, beach nourishment is a form of beneficial use of dredged material.
Beach scraping	Also referred to as 'nature assisted beach enhancement' is a mechanical intervention to speed up the natural processes of berm and foredune recovery after a storm event.
CEA	Coastal Environment Area
CBA	Cost-benefit Analysis
CM Act	NSW *Coastal Management Act 2016*
CM Manual	The NSW Coastal Management Manual (OEH, 2018b).
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 hazard	Defined in the CM Act to mean the following: • beach erosion • shoreline recession • coastal lake or watercourse entrance instability • coastal inundation • coastal cliff or slope instability • tidal inundation • erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.
Coastal inundation	Flooding of low lying areas by ocean waters, caused by a higher than normal sea level (e.g. due to storm tide).

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

Abbreviation / Term	Term
Coastal Management Area (or CMA)	Any one of four areas that make up the coastal zone as defined in the CM Act. These are the coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area, and the coastal use area.
Coastal Management Program (CMP)	A long-term strategy for the coordinated management of land within the coastal zone, prepared and adopted under Part 3 of the CM Act.
Coastal processes	Coastal processes are the set of mechanisms that operate at the land-water interface. These processes incorporate sediment transport and are governed by factors such as tide, wave and wind energy.
Coastal 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 threat	A process or activity that is putting pressure on or impacting on the health or function of a coastal ecosystem, or on the amenity and social or cultural value of the coastal landscape.
CN	City of Newcastle
CUA	Coastal Use Area
CVA	Coastal Vulnerability Area
CWLRA	Coastal Wetlands and Littoral Rainforest Area
CZEAS	Coastal Zone Emergency Action Strategy
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DPE	The former NSW Department of Planning and Environment; now split into two departments, DPHI and DCCEEW.
DPHI	NSW Department of Planning, Housing and Infrastructure
DPI	NSW Department of Primary Industries
Dune transgression (or major sand drift)	Sand drift describes the movement of sand by wind. On the coast, this generally describes sand movement resulting from natural or human-induced degradation of dune vegetation, resulting in either nuisance or major sand drift. Dune transgression is classified as major sand drift.
Foredune	The larger and more mature dune lying between the incipient dune and the hinddune 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'.
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.

Abbreviation / Term	Term
Highest astronomical tide (HAT)	The highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions.
HWC	Hunter Water Corporation
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	Local Aboriginal Land Council
LGA	Local Government Area
LLS	Local Land Services
Longshore transport (littoral drift)	Refers to the sediment moved along a coastline under the action of wave-induced longshore currents.
Managed retreat	Managed retreat allows the shoreline to migrate landward unimpeded. It allows an area that was not previously exposed to coastal processes and hazards to become exposed, for instance by removing coastal protection works. Managed retreat may involve the relocation landward, out of a coastal risk area, of homes and infrastructure under threat from coastal erosion, recession or inundation.
MCC	MidCoast Council
Mean High Water Mark (MHWM)	The line of the medium high tide between the highest tide each lunar month (the springs) and the lowest tide each lunar month (the neap) averaged over out over the year.
MHL	Manly Hydraulics Lab
Multi-criteria analysis (MCA)	A logical and structured decision-making tool for complex problems involving multiple factors or criteria, where a consensus is difficult to achieve. It may involve processes such as ranking, rating (with relative or ordinal scales) or pairwise comparisons. The process allows participants to consider, discuss and test complex trade-offs among alternatives.
No or low regrets options	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.
NPWS	NSW National Parks and Wildlife Service
NSW IP&R Framework	The NSW Integrated Planning and Reporting Framework
Probabilistic hazard assessment	A risk-based approach to managing coastal hazards that takes uncertainty into account by considering both the likelihood and consequence of hazard occurrence. It applies a stochastic simulation to evaluate coastal processes. The technique uses a distribution of values for each parameter to account for expected variation, or uncertainty, rather than single values. Parameters are then combined by a monte-carlo technique to produce a probabilistic forecast of future shoreline position.
PSC	Port Stephens Council
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,

Abbreviation / Term	Term
	concrete or other hard materials are used, depending on the specific design requirements.
Riparian	Pertaining to the banks of a body of water, such as an estuary.
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.
SLSC	Surf Life Saving Club
Storm surge	The increase in coastal water level caused by the effects of storms. Storm surge consists of two components – the increase in water level caused by the reduction in barometric pressure and the increase in water level caused by the action of wind blowing over the sea surface (wind set-up).
Storm tide	An abnormally high water level that occurs when a storm surge combines with a high astronomical tide. The storm tide must be accurately predicted to determine the extent of coastal inundation.
Swell waves	Ocean waves that travel beyond the area where they are generated.
Threats	In the coastal management context, a threat is a process or activity which puts pressure on one or more coastal assets or values. Threats may include land uses (e.g. urban, recreation), land management, climate change, industrial discharges, stormwater runoff, overfishing, invasive species as well as the pressures from coastal hazards.
Threshold	Can be identified for aspects of coastal systems, to highlight tipping points for irreversible change. An ecological threshold is the point at which there is an abrupt change in the structure, quality, or functioning of an ecosystem or where external changes produce large and persistent responses in an ecosystem. A species threshold may disrupt aspects of the species population, productivity, reproduction, or habitat in response to a stressor. Such 'tipping points' can lead to unwanted changes in ecosystems and may slow the recovery of ecosystems or limit their ability to achieve more resilient states following a disturbance. Similarly, a social or economic threshold of change in a coastal community indicates the point at which the structure, function, social connectedness, equality or economic activity of the community changes beyond recovery. Thresholds can also be defined for coastal water levels as they relate to the resilience of certain types of development.
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.
Trigger	Pre-negotiated decision-making points and commitments, so that action on coastal risks is taken when necessary, and when it is most convenient and affordable for the affected community.
Wave 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.

Abbreviation / Term	Term
WCLB	Worimi Conservation Lands Board
Wind waves	Ocean waves resulting from the action of the wind on the surface of the water.

Executive Summary

Port Stephens Council is, with the assistance of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), preparing a Coastal Management Program (CMP) to provide strategic direction and specific actions to address priority threats to the coast and maintain the ecological, social and economic values of the Port Stephens coastal zone.

The State Government requires that CMPs be prepared in accordance with the mandatory requirements for CMPs specified in the *Coastal Management Act 2016* (the CM Act) and accompanying NSW Coastal Management Manual (CM Manual; OEH, 2018b).

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

- Address coastal hazard risks;
- Preserve habitats, cultural uses and values;
- Encourage sustainable agricultural, economic and built development in the coastal zone;
- Maintain or improve recreational amenity and resilience; and
- Adapt to emerging issues such as population growth and climate change.

A CMP is prepared in five stages as per the Coastal Management Manual (OEH, 2018b), as illustrated in **Figure ES-1**.

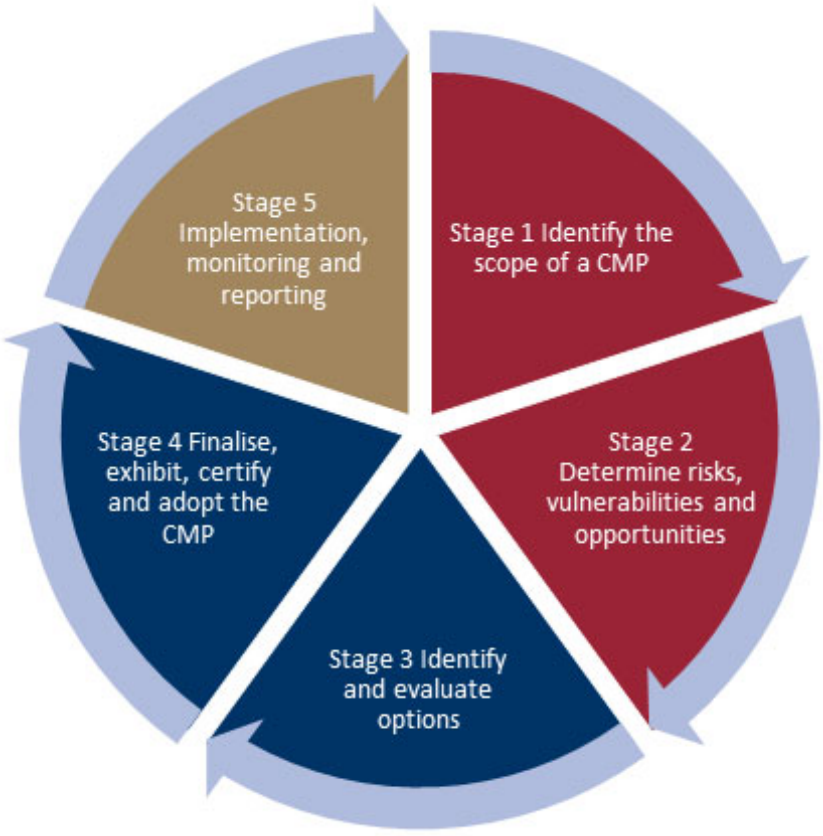

Figure ES-1 Stages in preparing and implementing a CMP (after: OEH, 2018b)

CMP Study Area

The study area comprises the coastal zone of the Port Stephens Local Government Area (LGA). The coastal zone includes the four Coastal Management Areas (CMAs) as defined under the CM Act:

- Coastal Wetlands and Littoral Rainforest CMA;
- Coastal Vulnerability Area (currently not mapped);
- Coastal Environment Area (CEA); and
- Coastal Use Area (CUA).

The study area is mapped in **Figure ES-2**. It is noted that the northern shore of Port Stephens is only included in the study area up to the LGA boundary.

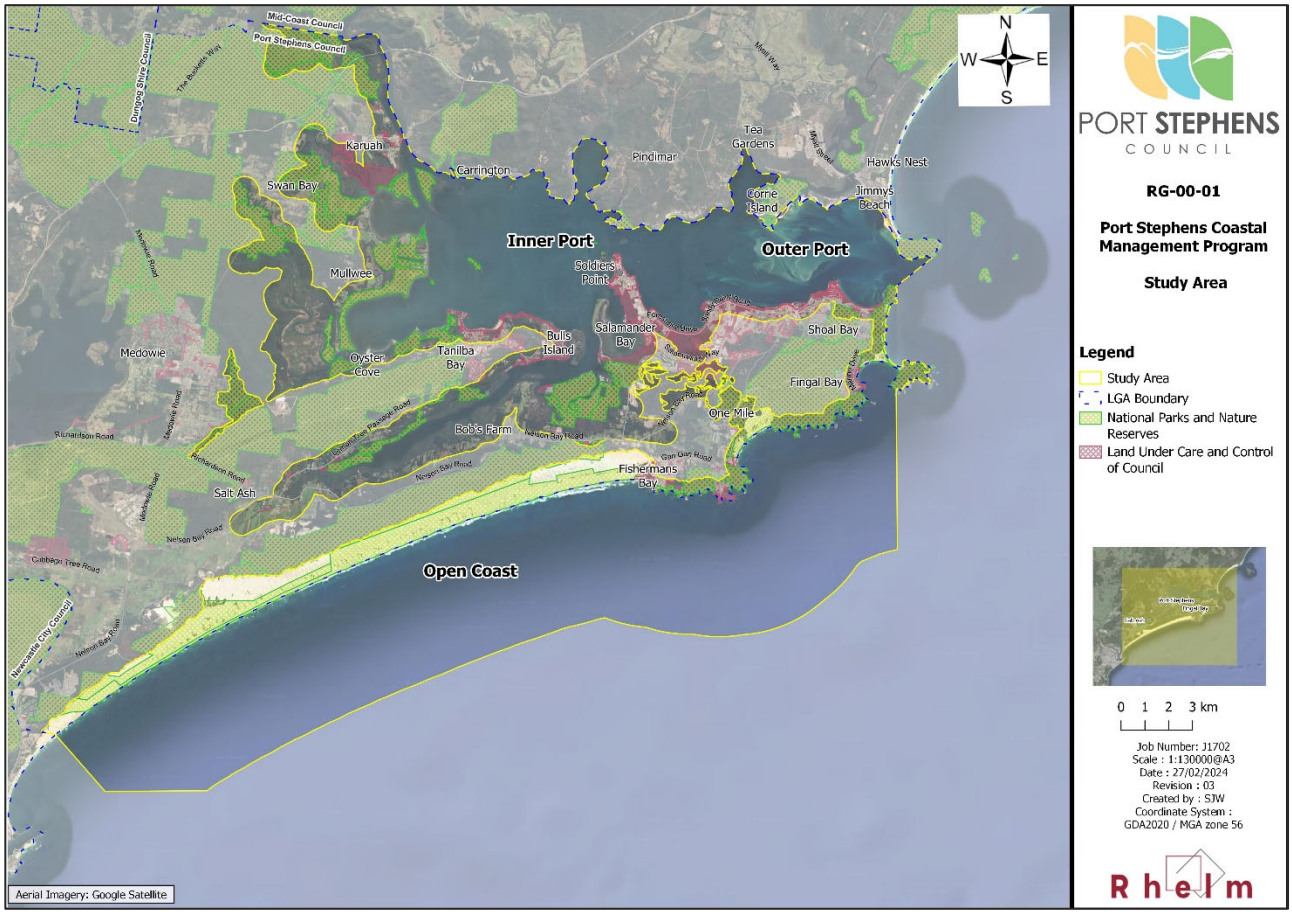

Figure E-S2 Port Stephens CMP study area

Separate CMPs are being prepared for the coastal zones adjacent to the Port Stephens CMP study area, including the Hunter River estuary CMP, which Port Stephens Council is also involved with, and the Southern Tidal Estuaries CMP being prepared by MidCoast Council, which will include the northern shore of the Port.

Strategic Direction for the CMP

The CM Act sets out the State-wide objects and objectives for managing the NSW coastal zone, including specific objects for CMAs.

The strategic vision statement for the Port Stephens CMP is presented below:

Our community is resilient to environmental risks, coastal hazards and climate change.

Supporting the vision are a series of local coastal management objectives that have been developed to align with the objects of the CM Act. The management objectives for the Port Stephens CMP are summarised in **Table ES-1**.

Table ES-1 Port Stephens Coastal Management Objectives

Collaboration	Encourage collaboration and partnership with government, agencies and our community to manage and protect the coastal zone.
Biodiversity & ecosystem integrity	Protect biological diversity and ecosystem integrity by maintaining and improving water quality and estuary health.
Climate change	Mitigate and build resilience to current and future coastal hazards and risks.
Land use planning	Facilitate ecologically sustainable development in the coastal zone and prioritise sustainable land use planning in decision making to maintain and improve public access, amenity and use.
Aboriginal custodianship	Support and protect our Aboriginal community's spiritual, social, customary and economic use of the coastal zone.
Coastal economies	Support sustainable economic opportunities within the coastal zone.

Values of the Study Area

The Stage 1 Scoping Study (PSC, 2020) provides a review of the community engagement undertaken in relation to how the community value the coastal zone. The key coastal values have been synthesised and summarised and are presented in **Table ES-2**.

Table ES-2 Key values of the study area

	Theme	Values
	Unique character	• Natural beauty, natural coastal landscapes • Aboriginal cultural heritage and European heritage • Visual amenity • Conservation and scientific values
	Public access & amenity	• Safe and accessible public open spaces along the foreshore for people to gather, socialise and participate in community activities • Encourages an active healthy lifestyle • Boating and fishing • Water quality
	Sustainable development	• Maintenance of the local character and values • Infrastructure to support the development, use and enjoyment of the coastal zone • Economic activities, including agriculture, fishing, tourism and commercial sand extraction • Sustainability and efficiency

	Theme	Values
	Resilience	• Resilience of the natural and built environment to coastal and other natural hazards • Resilience of the natural and built environment to climate change
	Biodiversity & ecosystem integrity	• Important habitat for key species such as seagrasses, migratory shorebirds and koalas • Wildlife corridors • Coastal wetlands and littoral rainforest • Good water quality and healthy ecosystems
	Equity & fairness	• Access to the foreshore reserves, waterways and natural environment for all

Threats to the Study Area

There are a number of coastal hazards and threats to the Port Stephens coastal zone, its coastal uses and values. A key outcome of the Stage 1 Scoping Study (PSC, 2020) was to understand and prioritise the threats to the coastal zone, which were developed from a range of sources, including community and stakeholder feedback. The Stage 1 Scoping Study considered 16 key threats with respect to both the environmental and socio-economic impacts to the study area.

The first pass risk assessment identified locations where threats to the coastal zone (such as erosion and inundation) may result in unacceptable consequences (e.g. loss of public assets or private assets). These locations were then assessed in further detail in Stage 2.

The CMP Stage 2 (BMT, 2021a) undertook a range of coastal hazard and vulnerability studies to further develop the risk assessment undertaken in Stage 1, including coastal inundation, tidal inundation, coastal erosion and dune transgression.

The Stage 1 and Stage 2 risk and vulnerability assessments, along with engagement with the community and stakeholders, assisted Council and community to understand the complexity of the issues and risks affecting the environmental, social and economic assets and values in each CMA.

This report presents an updated risk assessment for the Port Stephens coastal zone, the outcomes of which are summarised in **Table ES-3**.

Table ES-3 Threats to the Port Stephens coastal zone

Threat	Consolidated Present Day Risk	2040	2070	2120
Coastal Hazard Threats				
CH Threat 1 – Beach erosion	Medium	High	High	High
CH Threat 2 – Shoreline recession	Medium	High	High	Extreme
CH Threat 3 – Inundation with wind-blown sand	Medium	Medium	High	High

Threat	Consolidated Present Day Risk	2040	2070	2120
CH Threat 4 – Coastal inundation	High	High	High	Extreme
CH Threat 5 – Tidal inundation	Low	High	Extreme	Extreme
CH Threat 6 – Cliff / slope instability	Medium	Medium	Medium	Medium
CH Threat 7 – Accretion of marine sand	High	High	High	High
Water Quality Threats				
WQ Threat 1 – Urban stormwater pollution	Medium	High	High	High
WQ Threat 2 – ASS runoff	Medium	Medium	Medium	Low
WQ Threat 3 – Agricultural runoff pollution	Medium	High	High	High
WQ Threat 4 – Point source discharge	Medium	High	High	High
WQ Threat 5 – Marine debris	High	High	High	High
Biodiversity Threats				
BD Threat 1 – Land clearing	High	High	High	High
BD Threat 2 – Biosecurity	High	High	High	High
Development and Industry Threats				
LC Threat 1 – Land contamination	High	High	High	High
ME Threat 1 – Mining & extractive industries	High	High	High	High
Recreational Activity Threats				
RA Threat 1 – Boating pressures	Medium	High	High	High
RA Threat 2 – Encroachment onto public land	Medium	High	High	High

Identification and Evaluation of Coastal Management Options

This CMP provides a management framework that aims to protect the socio-economic, biodiversity and cultural values associated with the Port Stephens coastal zone and to manage the potentially conflicting desires to protection of coastal biodiversity and enhancing recreational and economic opportunities.

A total of 158 potential management options (refer **Appendix D**) spread across the entire Port Stephens coastal zone were compiled via an audit of previous management plans and studies, engagement with the community and agency stakeholders, and the outcomes of the Stage 2 CMP vulnerability assessments. There is a somewhat higher density of options in the Outer Port, reflective of the higher density of development and economic activity in this part of the study area, which results in a higher overall risk from coastal hazards and impacts of human activities on the coastal zone.

Initially, a **feasibility** assessment was undertaken to 'rule out' any options that did not address an existing or future risk to the coast, to consolidate overlapping options, or to identify options that were not feasible from an engineering, legal or implementation perspective.

The feasibility assessment outcomes are provided in **Appendix E** and site-specific management options are mapped in the accompanying map (**RG-00-13**). A total of 67 management options passed the feasibility assessment and were progressed to the viability assessment.

Of the 92 management options that did not progress to the viability assessment:

- 55 were deemed to be infeasible based on evaluation against the criteria in **Section 5.4**; and
- 37 were assigned to the category 'Other', which applied to management options that:
    - Were removed as a stand-alone option and either incorporated into another option, flagged for consideration in the CZEAS or under one of the proposed adaptation strategies,
    - Had already been completed by Council, or
    - Were considered 'business as usual' and not necessary to retain in the CMP.

The refined list of 67 options was then subjected to **viability** assessment, which involved a simple economic analysis and a multi-criteria analysis (MCA) for options on the basis of:

- How well the options addressed the threats;
- How well the option addressed the management objectives; and
- A simple measure of 'value for money' based on the capital and ongoing cost estimates.

The **acceptability** of the management option to the community, Council and key stakeholders was also considered.

These inputs were used to develop a final score and rank each of the management objectives against each other.

The options evaluation outcomes are presented in **Section 6** and **Appendix F**. All of the options evaluated were considered to be 'viable'.

Recommendations for the CMP

While the options evaluation outcomes provide a methodical framework for comparing options, the decision as to which options should be recommended for inclusion in the CMP is generally influenced by a range of factors, principally what is feasible with respect to available resources and funding.

The final step in Stage 3 was for the project Steering Committee to review the final list of viable management options and determine which options should be included as management actions in the CMP. The majority of viable management options were recommended for adoption in the CMP.

However, some management options were not recommended for the CMP. This process was informed by consideration of the cost of implementation of the management option and the potential benefits that might be realised. The rationale for excluding these options from the CMP is provided in **Section 7.1** and **Appendix G.**

One management option, 'Undertake works to stabilise the foredune on Worimi Conservation Lands' (CH007), is still being discussed with the implementing agencies and will be confirmed during public exhibition.

Of the 61 viable management options that were recommended for the CMP, there were:

- 28 options that address Coastal Hazard Threats;
- 21 options that address Recreation and Access Threats;
- 9 options that address Water Quality Threats;
- 8 options that address Biodiversity Threats; and
- 1 that addresses a Mining and Extractive Industries Threat.

There were:

- 38 options that are categorised as an 'Active Intervention';
- 10 options categorised as 'Planning for Change';
- 8 options that are categorised as 'Alert' options;
- 3 options that 'Avoid Future Impact'; and
- 2 'Emergency Response' options.

Options descriptions are provided for the more complex management options in **Appendix H**.

The final list of 60 management options recommended for inclusion as management actions in the CMP (excluding the management option (CH007) yet to be confirmed) is provided in **Appendix G** in tabular format with an accompanying map (**RG-00-11**).

The total cost of implementation of the CMP over the first 10 years would be $14.45M. This includes all options irrespective of the implementing agency, and does not take into account the potential to obtain grants to offset some of the cost.

Next Steps

Following finalisation of this Stage 3 Report, the CMP will progress to Stage 4 of the CMP process and the following activities will be undertaken:

- Development of a business plan 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;
- Obtaining stakeholder agreement in writing for any management actions for which they are primarily (or hold shared) responsibility for implementing, or which are proposed on land for which they are the identified landowner;
- Preparation of the Coastal Zone Emergency Action Strategy (CZEAS);
- Initial review of the draft CMP and CZEAS by the Steering Committee and Stakeholder Reference Group;
- Public exhibition of the draft CMP and CZEAS;
- Updating of the CMP in response to submissions received. This may result in modifications to the management actions in the CMP, the addition of new management actions and updating of the acceptability scoring based on community and stakeholder feedback received;
- Adoption of the final CMP and CZEAS by Council; and
- Certification of the final CMP by the Minister, after which it will have statutory effect and proceed to Stage 5 of the CMP process, the implementation phase. The CMP and the progress of the management actions will be reviewed periodically to ensure the actions remain relevant and the implementation of the plan is being achieved.

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1 Introduction

1.1 Overview

Port Stephens Council (hereafter 'Council' or PSC) is, with the assistance of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), preparing a Coastal Management Program (CMP) to provide strategic direction and specific actions to address threats to the coast and maintain the ecological, social and economic values of the Port Stephens coastal zone.

The State Government requires that CMPs be prepared in accordance with the mandatory requirements for CMPs specified in the *Coastal Management Act 2016* (the CM Act) and accompanying NSW Coastal Management Manual (CM Manual; OEH, 2018b). A CMP outlines the strategic aims for the coordinated management of the coastal zone and identifies specific actions to mitigate the threats and issues identified for the coast that are to be implemented over the next 10 years. The CMP is an operational document for the community and government to take action to manage, preserve, improve, promote and rehabilitate the coast.

In effect, a CMP is a plan of action for Council, public authorities and land managers responsible for management of the coastal zone to:

- Address coastal hazard risks;
- Preserve habitats and cultural uses and values;
- Encourage sustainable agricultural, economic and built development in the coastal zone;
- Maintain or improve recreational amenity and resilience; and
- Adapt to emerging issues such as population growth and climate change.

1.2 Strategic and Statutory Context

Under Part 3 of the CM Act, local Councils are required to prepare CMPs in accordance with the coastal management framework (**Figure 1-1**), which reflects the broader suite of statutory instruments and strategies that provide for the Ecologically Sustainable Development (ESD) of the coastal zone of NSW.

The CM Manual (OEH, 2018b) provides information and guidance to Councils in preparing their CMPs.

Figure 1-1 Coastal Management Framework (after: OEH, 2018b)

A CMP is prepared in five stages as illustrated in **Figure 1-2**. Previous stages that have been completed for the Port Stephen coastal zone to date include:

- Coastal Management Program Stage 1 Scoping Study (PSC, 2020), which set the context and scope for the CMP, including evaluation of threats to the Port Stephens coastal zone; and
- Port Stephens Coastal Management Program – Stage 2 (BMT, 2021a), which involved a range of coastal hazard and risk assessments to fill existing knowledge gaps.

In 2022 Council engaged Rhelm and Bluecoast Consulting Engineers to support Council in undertaking the next stages of the CMP process (highlighted in **Figure 1-2**):

- Stage 3, including:
    - Undertaking community and stakeholder engagement on coastal hazards, risk and management options,
    - Review of the current planning framework with respect to management of coastal hazards and threats to the coastal zone and provision of recommendations on alternative approaches to managing these risks, and
    - Options identification and evaluation process and recommendations for the CMP;
- Stage 4, including:
    - Preparation of the Coastal Zone Emergency Action Strategy (CZEAS) - a plan to manage risk to built assets and life as a result of a coastal storm, and
    - Preparation, exhibition, certification and adoption of the CMP.

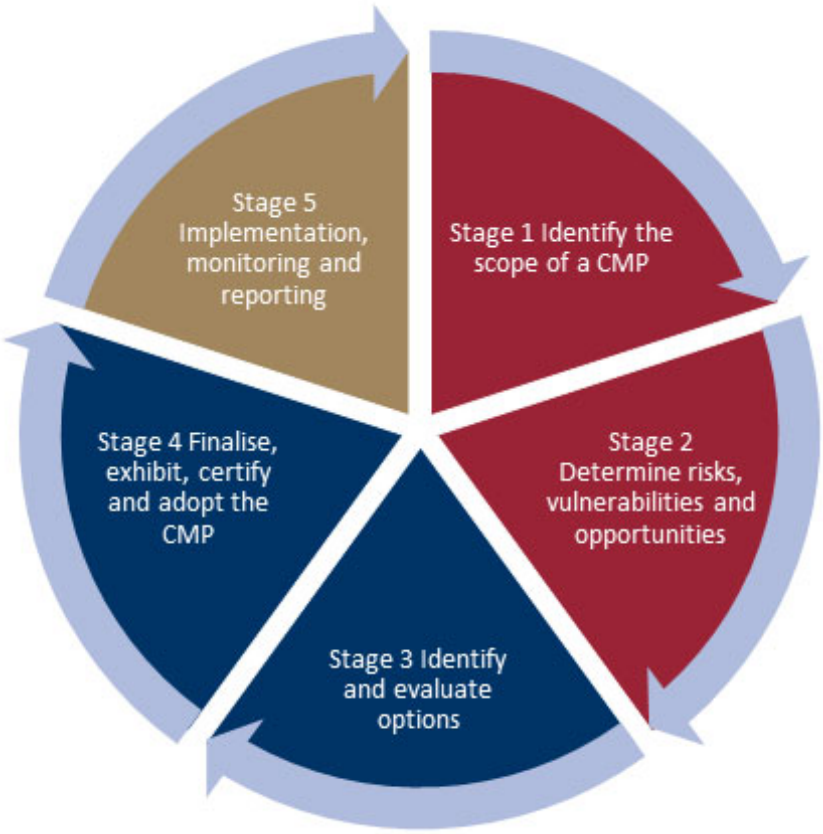

Figure 1-2 Stages in preparing and implementing a CMP (after: OEH, 2018b)

1.3 Purpose and Structure of this Report

This report has been prepared to document the outcomes of Stage 3 of the CMP process, including the options identification and evaluation methodology, and identify the options that are recommended for adoption as management actions in the Port Stephens CMP.

This CMP Stage 3 report has been structured as follows:

- The Port Stephens coastal zone, the study area, is defined in **Section 2**;
- The key values and issues relating to the study area are discussed in **Section 3;**
- The risk assessment undertaken in CMP Stage 1 and updated in Stage 3 is provided in **Section 4;**
- The options identification and evaluation methodology is presented in **Section 5**;
- The outcomes of the options assessment are discussed in **Section 6**; and
- The recommendations for the Port Stephens CMP are summarised in **Section 7**.

Supporting information provided in appendices to this report includes:

- A compendium of maps in **Appendix A**;
- A summary of the outcomes of the review existing planning and development controls relevant to management of coastal hazards and threats to the coastal zone (**Appendix B**);
- The revised risk assessment in **Appendix C**;
- The full list of management options developed during Stage 3 is provided in **Appendix D**;
- The outcomes of the feasibility and viability assessments in **Appendices E and F** (respectively), including accompanying maps;
- A list and map of the options recommended for adoption as management actions in the CMP in **Appendix G**; and
- Detailed options summaries for a select subset of the more complex or costly options considered (**Appendix H**).

2 Area Covered by the CMP

The study area comprises the coastal zone of the Port Stephens Local Government Area (LGA), encompassing the Open Coast, Outer Port and Inner Port areas. As discussed in the Scoping Study (PSC, 2020), each of these three regions within the broader study area (the Open Coast, Inner Port and Outer Port) differ with respect to their exposure and vulnerability to different types of coastal hazards and their environmental and social values and uses.

The landward extent of the majority of the study area is defined by the Coastal Management Areas (CMAs) mapped in the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the Resilience and Hazards SEPP). Along the northern shoreline, the landward extent is defined by the LGA boundary.

The CMP study area is shown on **Map RG-00-01** in **Appendix A**.

For that portion of the coastal zone falling within the LGA boundaries that lies within the Hunter River estuary catchment (and including Fullerton Cove), a separate CMP is being progressed. As councils that intersect the catchment, both PSC and City of Newcastle (CN) are involved in the Hunter River Estuary CMP.

Separate CMPs are also being progressed by MidCoast Council (MCC) for their LGA. MCC is currently in the process of developing a CMP for its Southern Estuaries. The CMP will address key catchments throughout the MidCoast LGA including the Karuah River, North Arm Cove, Myall River and Kore Kore Creek catchments which form the Northern foreshore of the Port Stephens Estuary. Work on the Southern Estuaries CMP commenced after the Port Stephens CMP had been substantially progressed. As such, the boundaries for the Port Stephens CMP had been established and confirmed to boundary of the two LGAs. To accommodate this, the study area to be covered in the Southern Estuaries CMP includes the northern foreshore of Inner Port Stephens, from Yallimbah Creek to Pindimar (including Tea Gardens and Hawks Nest) and including North Arm Cove and The Karuah River up to the limit of tidal influence, one kilometre south of the village of Booral (Water Technology, 2022).

In addition, MCC is also in the process of preparing the MidCoast Open Coast CMP, which will include Jimmy's Beach.

2.1 Coastal Management Areas

There are four CMAs defined under the CM Act. Three of the four CMAs, as mapped under the Resilience and Hazards SEPP, have been included in the study area and therefore the scope of the Port Stephens CMP:

- **Coastal Wetlands and Littoral Rainforest Area (CWLRA)** – there are extensive areas of Coastal Wetlands around Tilligerry Creek, between Oyster Cove and Medowie, west and north of Swan Bay, and extending from Salamander Bay through Taylors Beach, Bobs Farm and to Anna Bay (**Map RG-00-02**). There are small areas of Littoral Rainforest mapped at Nelson Head, Soldiers Point and Taylors Beach (**Map RG-00-03**).
- **Coastal Environment Area (CEA)** – Comprises land containing coastal features such as the coastal waters of the State, estuaries, coastal lake, coastal lagoons and land adjoining these features, including headlands and rock platforms (OEH, 2018a). The extent of the CEA within the study area is mapped in **Map RG-00-04**.
- **Coastal Use Area (CUA)** – The coastal use area includes land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (now or in the future) (OEH,

2018a). There are a range of social and economic activities and development within the Port Stephens CUA, as mapped in **Map RG-00-05**.

2.2 Coastal Sediment Compartments

The Port Stephens CMP study area is located within one primary sediment compartment, the Port Stephens compartment, which extends from Cape Hawke to Nobbys Head. Within this larger primary sediment compartment there are three secondary sediment compartments that extend across the study area (refer **Map RG-00-06**):

- The Stockton Bight compartment which extends along the open coast from Birubi Point to the south and beyond the CMP study area;
- The Anna Bay compartment that extends along the open coast from Birubi Point north to Tomaree Point; and
- The Port Stephens compartment, which encompasses the Inner and Outer Port areas.

The Port Stephens primary sediment compartment extends across parts of the MidCoast LGA to the north and Newcastle LGA to the south.

3 Key Values and Issues

The Port Stephens coastal zone encompasses a range of wide range of environments, including:

- The Stockton Bight transgressive sand dunes;
- The rocky headlands and embayed beaches of the open coast;
- The towns and villages scattered around the Port;
- The National Parks and Nature Reserves, including the Worimi Conservation Lands; and
- The Port Stephens-Great Lakes Marine Park.

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

The Stage 1 Scoping Study (PSC, 2020) describes in detail the environmental, social and cultural, economic and future context for coastal management planning for Port Stephens. This sets the scope for the CMP and provided an increased understanding of the values of and priority threats to the study area.

Sections 3.1 and **3.2** of this report provide a summary of the values of the study area and the priority threats to these values, identified during preparation of the Stage 1 Scoping Study based on consultation with key stakeholders and feedback from the community.

Section 3.3 of this report provides a summary of the Stage 2 Vulnerability Assessment outcomes, which relate primarily to coastal hazards, addressing knowledge gaps identified in Stage 1 with respect to the Port Stephens LGA.

3.1 Values of the Study Area

The Stage 1 Scoping Study provides a review of the community and stakeholder engagement undertaken in relation to how the community value the coastal zone. The key coastal values have been synthesised and summarised and are presented in **Table 3-1**.

Table 3-1 Key values of the study area

	Theme	Values
	Unique character	• Natural beauty, natural coastal landscapes • Aboriginal cultural heritage and European heritage • Visual amenity • Conservation and scientific values
	Public access & amenity	• Safe and accessible public open spaces along the foreshore for people to gather, socialise and participate in community activities • Encourages an active healthy lifestyle • Boating and fishing • Water quality

	Theme	Values
	Sustainable development	• Maintenance of the local character and values • Infrastructure to support the development, use and enjoyment of the coastal zone • Economic activities, including agriculture, fishing, tourism and commercial sand extraction • Sustainability and efficiency
	Resilience	• Resilience of the natural and built environment to coastal and other natural hazards • Resilience of the natural and built environment to climate change
	Biodiversity & ecosystem integrity	• Important habitat for key species such as seagrasses, migratory shorebirds and koalas • Wildlife corridors • Coastal wetlands and littoral rainforest • Good water quality and healthy ecosystems
	Equity & fairness	• Access to the foreshore reserves, waterways and natural environment for all

3.2 Threats to the Study Area

There are a number of threats to the Port Stephens coastal zone, its coastal uses and values. A key outcome of the Stage 1 Scoping Study (PSC, 2020) was to understand and prioritise the threats to the coastal zone. The list of threats was developed from a range of sources of information, including community and stakeholder feedback, and the level of risk from each threat was evaluated for different planning horizons.

The first-pass risk assessment undertaken in Stage 1 adopted Council's Corporate Risk Matrix, modified to include additional descriptors, enabling an assessment of risk to the wider community within the study area.

The Stage 1 Scoping Study considered 16 key threats with respect to both the environmental and socio-economic impacts for each of the three parts of the study area individually. Risk was evaluated for the present day for each of the three parts of the study area individually, and for the study area as a whole for a future planning horizon. Aspects considered in the risk assessment included:

- The effects of climate change;
- The local and regional-scale effects of coastal processes;
- The ambulatory and dynamic nature of the shoreline;
- Population growth and demographic changes; and
- Projected use and development of the coastal zone.

The key threats to the coastal zone identified through a literature review and via engagement with key stakeholders that were considered in Stage 1 Scoping Study (PSC, 2020) included:

- Beach erosion (referred to hereafter as 'coastal erosion', consistent with the CM Act and CM Manual);
- Aeolian sand inundation (referred to hereafter as 'Inundation with wind-blown sand');
- Coastal inundation (which was assumed to include tidal inundation);
- Cliff / slope instability;
- Marine sand inundation (referred to hereafter as 'Accretion of marine sand');
- Urban stormwater runoff;
- Acid Sulfate Soils (ASS) runoff;
- Agricultural runoff;
- Point source discharges;
- Marine debris;
- Land clearing;
- Weeds, pests and diseases;
- Land contamination;
- Mining and extractive industries;
- Boating pressures; and
- Encroachment onto public land.

3.3 Threats Refined by the Stage 2 Vulnerability Assessment

The CMP Stage 2 (BMT, 2021a) undertook a range of coastal hazard and vulnerability studies to build on the risk assessment undertaken in Stage 1. The work undertaken in Stage 2 included:

- A probabilistic assessment of beach erosion and shoreline recession to derive probable **coastal erosion** hazard lines (or extents). The coastal erosion hazard lines were prepared for the Open Coast area only. Coastal erosion is the sum of:
    - *Beach erosion* - which occurs over a period of days during a coastal storm event. Once the storm passes, the beach then gradually recovers over a period of months or years as the sand is transported back onto the beach under normal wave conditions.
    - *Shoreline recession* – which results from a net loss of sand and occurs over a period of years to decades. If a very big storm has occurred, the sand eroded from the beach may be taken too far away and unable to make it back onto the same beach. If there is no new sand coming into the system, this can become a permanent loss of sand and the coastline gradually moves landward. Higher water levels due to sea level rise will accelerate shoreline recession.

  The 'most likely' coastal erosion hazard lines for the present day and the 2120 planning horizon are mapped for the Open Coast in **Map set RG-00-07 A to C**.
- A semi-qualitative assessment of risk from coastal erosion was undertaken for the Outer Port only, but no erosion hazard lines were developed for these locations.
- A **coastal inundation** assessment which considers elevated ocean water levels (storm tide) for the 20-year Average Recurrence Interval (ARI) and 100-year ARI storm events. Coastal inundation is primarily associated with storms resulting in storm surge and waves. It means that ocean levels rise above normal elevations and inundate low-lying areas by overtopping dunes, structures and barriers. The duration of coastal inundation may be several hours and will vary depending on the timing of the storm (e.g. if storm surge peaks on the high tide). Once the coastal storm passes, the

water recedes, and ocean water levels return to their normal tidal levels. The risk of coastal inundation will increase as sea levels rise. The 'expected' 20-year ARI and 100-year ARI coastal inundation extents are mapped in **Map RG-00-08** and **Map RG-00-09**, respectively.

- A **tidal inundation assessment**, which adopted the Highest Astronomical Tide (HAT) to show areas that are vulnerable to inundation by the regular astronomical tides. Low-lying land would be inundated for a period of hours during the highest tidal water levels. Under sea level rise conditions, the extent of tidal inundation will increase and low-lying will become permanently inundated. The 'expected' tidal inundation extents corresponding to the HAT are mapped for the present day and 2120 in **Map RG-00-10**.
- An assessment of **dune transgression** at Stockton Bight, which developed sand drift hazard set back lines. Dune transgression is the landward movement of sand due to aeolian (wind) transport. The dune transgression hazard lines for the 2120 planning horizon are mapped for the open coast in **Map RG-00-07 A**.

The hazard assessments described above considered the present day (2020), 2040, 2070 and 2120 planning horizons, taking into account sea level rise under climate change conditions.

The CMP Stage 2 Study prepared by BMT (2021a) also reports on the results of:

- An assessment of risk to key Council assets (roads, stormwater and key facilities, e.g. surf lifesaving clubs (SLSCs), schools, etc.) arising from coastal and tidal inundation (BMT, 2022a);
- An assessment of risk to private properties from coastal and tidal inundation (BMT, 2021a); and
- An audit and condition assessment of coastal protection structures (BMT, 2021b).

4 Risk Assessment

The Stage 1 Scoping Study (PSC, 2020) undertook an assessment of risk and identification of key threats for the Port Stephens CMP study area. As an outcome of the additional information and stakeholder inputs received in Stages 2 and 3 of the CMP, the risk assessment was updated in Stage 3 as follows:

- The 'coastal inundation' threat was separated into two categories, coastal inundation and tidal inundation, consistent with the Stage 2 vulnerability and risk assessments;
- In acknowledgement of the significant cultural heritage values of the study area, heritage impacts were added to the list of aspects considered, namely environmental and socio-economic impact categories;
- The present day risk ratings for each of the three study area regions was consolidated down into one single 'Present day by aspect' risk rating, adopting a rough average of the level of risk across the three areas. The 'Present day by aspect' risk rating was then rationalised into a single present day 'Consolidated present day' risk rating, adopting the highest risk rating for any of the three individual aspects;
- The 'Consolidated present day' risk rating was then used to evaluate future risk for the three future planning horizons consistent with the vulnerability assessment, namely: 2040, 2070 and 2120; and
- Finally, all the risk descriptors and ratings were reviewed in light of the outcomes of the additional vulnerability and risk assessments undertaken in Stage 2.

The outcomes of the updated threat and risk assessment for the Port Stephens coastal zone are summarised in **Table 4-1**. The full risk assessment (including descriptions of each threat) is provided in **Appendix C** along with copies of the risk matrix, likelihood and consequence criteria adopted in the Stage 1 Scoping Study risk assessment.

Table 4-1 Risk assessment outcomes

Threat	Consolidated Present Day Risk	2040	2070	2120
Coastal Hazard Threats				
CH Threat 1 – Beach erosion	Medium	High	High	High
CH Threat 2 – Shoreline recession	Medium	High	High	Extreme
CH Threat 3 – Inundation with wind-blown sand	Medium	Medium	High	High
CH Threat 4 – Coastal inundation	High	High	High	Extreme
CH Threat 5 – Tidal inundation	Low	High	Extreme	Extreme
CH Threat 6 – Cliff / slope instability	Medium	Medium	Medium	Medium
CH Threat 7 – Accretion of marine sand	High	High	High	High
Water Quality Threats				
WQ Threat 1 – Urban stormwater pollution	Medium	High	High	High
WQ Threat 2 – ASS runoff	Medium	Medium	Medium	Low
WQ Threat 3 – Agricultural runoff pollution	Medium	High	High	High

Threat	Consolidated Present Day Risk	2040	2070	2120
WQ Threat 4 – Point source discharge	Medium	High	High	High
WQ Threat 5 – Marine debris	High	High	High	High
Biodiversity Threats				
BD Threat 1 – Land clearing	High	High	High	High
BD Threat 2 – Biosecurity	High	High	High	High
Development and Industry Threats				
LC Threat 1 – Land contamination	High	High	High	High
ME Threat 1 – Mining & extractive industries	High	High	High	High
Recreational Activity Threats				
RA Threat 1 – Boating pressures	Medium	High	High	High
RA Threat 2 – Encroachment onto public land	Medium	High	High	High

5 Method of Identification and Evaluation of Management Options

5.1 Overview

The CMP process outlined in the CM Manual (OEH, 2018b) involves councils identifying coastal management issues relevant to the CMP study area and identifying coastal management actions appropriate to address the issues in an integrated and strategic manner consistent with provisions in Section 14 and 15 of the CM Act, reducing exposure to coastal hazards and other management issues, and taking advantage of opportunities. In doing so, Councils determine the priority of identified coastal management actions and propose integrated and strategic delivery pathways.

The process prescribed in the CM Manual follows four steps, summarised in **Figure 5-1.**

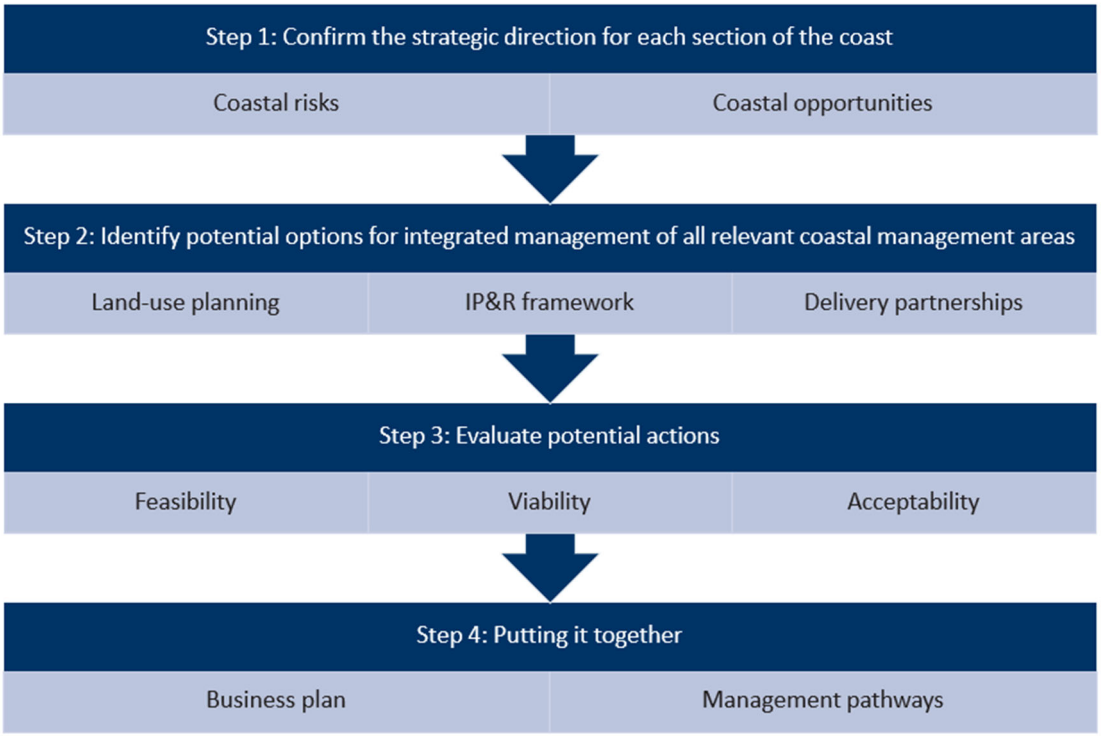

Figure 5-1 Options identification and evaluation process (after: OEH, 2018b)

Stages 1 and 2 of the CMP (including the engagement activities undertaken) developed an understanding of the coastal management issues, including an analysis of the risks, vulnerabilities and opportunities in the study area. This information is summarised in **Section 3**. As per Step 1 in **Figure 5-1**, the key values, risks and opportunities identified provided the basis for the strategic direction of the Port Stephens CMP detailed in **Section 5.2**.

Stage 3 of the Port Stephens CMP has involved identification and evaluation of management options, as per Steps 2 and 3 in **Figure 5-1,** to select preferred coastal management actions for inclusion in the CMP with a focus on achieving the objects of the CM Act.

This section of the report provides a summary of the methodology by which management options were identified (**Section 5.3**) and how they were evaluated (**Sections 5.4 and 5.5**).

5.2 Strategic Direction for the Port Stephens CMP

The CM Act sets out the State-wide objects and objectives for managing the NSW coastal zone, including specific objects for CMAs.

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 vision, objectives and strategic direction for the Port Stephens CMP developed by Council provide local context for the Port Stephens CMP that recognise the unique values and attributes of the study area and the community's aspirations for the coastal zone.

The long-term strategic direction for the study area is encapsulated in a vision established for management of the Port Stephens coastal zone and is consistent with the objects of the Act and community values identified in the Stage 1 Scoping Study. The strategic vision statement for the Port Stephens CMP is as follows:

Our community is resilient to environmental risks, coastal hazards and climate change.

Supporting the vision are a series of local coastal management objectives that have been developed to align with the objects of the CM Act. The management objectives for the Port Stephens CMP are summarised in **Table 5-1**.

Table 5-1 Port Stephens Coastal Management Objectives

Collaboration	Encourage collaboration and partnership with government, agencies and our community to manage and protect the coastal zone.
Biodiversity & ecosystem integrity	Protect biological diversity and ecosystem integrity by maintaining and improving water quality and estuary health.
Climate change	Mitigate and build resilience to current and future coastal hazards and risks.
Land use planning	Facilitate ecologically sustainable development in the coastal zone and prioritise sustainable land use planning in decision making to maintain and improve public access, amenity and use.
Aboriginal custodianship	Support and protect our Aboriginal community's spiritual, social, customary and economic use of the coastal zone.
Coastal economies	Support sustainable economic opportunities within the coastal zone.

In developing and implementing the CMP, the following guiding principles are being adopted by Council:

- We consider the unique character of each place.
- We are fair and equitable in outcomes and decisions.
- We listen, value and respect community input and feedback.
- We prioritise community safety in our planning and decision making.

5.3 Identification of Management Options

The first step in identifying potential options was to collate and review existing coastal studies and plans of management that had been prepared by Council for the study area, including:

- Port Stephens / Myall Lakes Estuary Management Plan Draft (Umwelt, 2000);
- Mambo Wetland Plan of Management (PSC, 2006);

- Living on the Edge A Foreshore Management Plan for Port Stephens (Umwelt, 2009);
- Halifax Park / Fly Point Sand Accumulation Study (BMT WBM, 2011);
- Tanilba Bay Foreshore Erosion Management Plan Coastal Processes, Concept Design Options and Foreshore Stabilisation Strategy (SMEC, 2012);
- Kangaroo Point Foreshore Study (Whitehead and Assoc., 2015);
- Soldiers Point Aboriginal Place Plan of Management (PSC and OEH, 2015);
- Little Beach Coastal Processes Study (RH DHV, 2016);
- Sandy Point / Conroy Park Foreshore Erosion and Drainage Management Plan (Whitehead and Assoc., 2018);
- Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021);
- An audit of the water quality related management actions from the Port Stephens Estuary Management Plan (BMT, 2022b); and
- Port Stephens Boating and Fishing Infrastructure Plan (Otium and Bligh Tanner, 2023).

The management actions in the plans and studies were audited for their implementation status and any actions that had yet to be implemented or were ongoing were identified and included in a 'long list' of potential management options.

Potential management options were also identified through various engagement activities, including:

- Initial engagement with Traditional Owners via members of the boards of the Worimi Local Aboriginal Land Council (LALC) and Worimi Conservation Lands Board (WCLB). In addition a presentation was made to the Birubi Point Cultural Heritage Advisory Committee. It was not possible to make contact and meet with the Karuah LALC during Stage 3;
- Workshops with PSC staff on:
    - Council assets subject to risk from coastal hazards,
    - Land use planning and development controls for management of risk from coastal hazards,
    - Potential management options for the CMP;
- Workshops with the Stakeholder Reference Group comprised of the range of stakeholders involved in different aspects of management of the Port Stephens coastal zone. These workshops included and initial presentation on coastal hazards and a management options workshop;
- Four face-to-face community drop-in sessions over 3-4 May 2023 on the coastal hazard mapping;
- Council staff also held on-site meetings with directly affected landholders in key locations;
- One virtual and three face-to-face workshops with community members over 7-8 June 2023 to discuss potential management options; and
- Opportunity for community members to identify management issues and suggest management options via an online Social Pinpoint map made available on Council's webpage.

Input from these engagement activities was incorporated into the long list of options.

5.4 Feasibility Assessment

The feasibility of the each of the management options was evaluated for their legal, technical and engineering feasibility (including confidence in performance) in relation to the objectives and intended outcomes. This evaluation was undertaken using the guidance in the CM Manual, by assessing the options against the criteria shown in **Table 5-2.** Feasible options were carried forward to a viability assessment, as described in **Section 5.5.**

Table 5-2 Feasibility Assessment Criteria

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

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

- The timeframe over which a management option would remain effective and if there are any limits to the effectiveness of the option (e.g. is there a threshold beyond which the response would fail or is rendered obsolete?);
- Evidence from application of the option in similar situations;
- The potential for any unintended or unanticipated negative consequences (sometimes referred to as perverse outcomes or maladaptation);
- Whether the option is irreversible and locks in a specific future action or adaptation pathway;
- Alternatively, whether the option is a low risk or 'no regrets' option, one that would be beneficial to implement irrespective;
- The level of expertise required to evaluate the design, implementation, monitoring and review of actions; and
- Whether the selection of a strategy allows for adaptive management.

5.5 Viability and Acceptability Assessments

The viability of coastal management options was assessed on a largely qualitative basis via a multi-criteria analysis (MCA).

The structure and criteria adopted for the MCA were driven by:

- The need to confirm consistency with the CM Act and the requirements of the CM Manual;
- The need to ensure the CMP contains actions that can be funded and implemented; and
- Consideration of the likely acceptance by the key stakeholders and the community (i.e. the acceptability assessment).

The management options short-listed through the feasibility assessment to progress to the viability assessment were evaluated on the basis of the following criteria:

- **Cost** – the capital cost and annually recurrent costs were estimated along with the year of implementation to consider the total cost over the 10 year period of implementation of the CMP;
- **Threat Mitigation Score** – each option was scored with respect to how effectively it would address each of the individual threats listed in **Section 3.2**, which were weighted based on the level of risk associated with each individual threat as described in **Table 5-3**. The scores were applied in accordance with the descriptors in **Table 5-4** and then averaged across each category of threat to sum to a single value in accordance with the formula below:

Threat Mitigation Score *= Average of Coastal Hazard Scores + Average of Water Quality Scores + Average of Biodiversity Scores + Average of Development & Industry Scores + Average of Public Recreation & Access Scores*

Objectives Score – scores were applied to each management option with respect to the option's impact on achieving the CMP objectives (refer **Table 5-1**) using the descriptors in **Table 5-4**;

Objectives Score *= Sum of each of the six objectives scores*

- **Acceptability Score** – for purposes of this report, scores were allocated for the likely community acceptance and stakeholder acceptance of the management option in accordance with the descriptors in **Table 5-5**. No weightings were applied. Community sentiment was gauged during the community drop-in sessions and workshops. It is intended that these scores be updated based on additional feedback received following public exhibition of the draft CMP;

Acceptability Score *= Community Acceptance Score + Council & stakeholder Acceptance Score*

- The **Total Score** – comprises the sum of the Threat Mitigation, Objectives, and Acceptability scores;
- The **Cost Adjusted Score** – was calculated dividing the total score by the cost weighting, which was applied in accordance with **Table 5-6**. This provides an indication of value for money; and
- The viability assessment also indicates which options are considered low or no regrets options.

Table 5-3 Threat mitigation weightings system

2040* Risk Rating for the Threat	Score
Low	1
Medium	2
High	3
Extreme	4

*2040 was chosen as it represents the timeframe closest to the end of the 10-year period for the CMP (i.e. 2034).

Table 5-4 Threat mitigation and objectives scoring system

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

Table 5-5 Community and stakeholder acceptability scoring system

Likely acceptance	Score
Strong support by a particular group (and no strong opposition) / wide level of general support	2
Option likely to be supported by some groups or stakeholders	1
Net neutral opinion / unsure	0
Mild opposition by some groups or stakeholders	-1
Strong opposition by a particular group or the community at large	-2

Table 5-6 Cost adjusted scoring system

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

6 Options Assessment Outcomes

6.1 Options Identification

The options identification process described in **Section 5.3** lead to the development of an initial list of 146 management options. Following review of the initial list of management options, Council, the community and other stakeholders identified an additional 12 management options to be considered, summing to a total of 158 management options.

The full list of 158 management options is provided in **Appendix D** in tabular format along with an accompanying map that shows the location of site-specific options is mapped in Map **RG-00-12**.

6.2 Feasibility Assessment Outcomes

The feasibility assessment outcomes are provided in **Appendix E** and site-specific management options are mapped in the accompanying map (**RG-00-13**). A total of 67 management options were identified as being feasible in the assessment and able to be progressed to the viability assessment.

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

- The option failed to address at least one of the identified threats in the risk assessment;
- The option would not be permissible under the current statutory framework (e.g. Options CH004 and CH024);
- The option was not considered feasible from an engineering perspective (e.g. insufficient space for implementation, or would not achieve the intended outcome);
- Options for which the engineering feasibility is identified as 'unknown' - a number of options to address beach erosion (CH Threat 1) or shoreline recession (CH Threat 2) were identified for the inner and Outer Port; however, in the absence of any probabilistic coastal erosion hazard mapping for these parts of the study area, the level of risk was not known. It was not possible to consider the magnitude or timing of a potential impact from coastal erosion on the values, uses or assets at the subject location. For many of these coastal protection options the cost was relatively high and there was potential for the works to protect both public and private assets. For such options, a detailed cost-benefit assessment is required, for which a critical input is the coastal erosion hazard lines to allow allocation of private and public benefits. For these reasons, a total of 44 options for which the risk reduction criteria was categorised as 'unknown' were not progressed to the viability assessment. Of these, eight would otherwise have been identified as infeasible under the engineering feasibility or statutory and policy compliance criteria. It is noted, however, that once the coastal erosion hazard lines are mapped under Option CH072, these options could be re-considered;
- Options 'to consider as part of a holistic adaptation strategy' – There are a number of individual options that seek to address a specific coastal hazard that would be significant investments and lock in a course of action that may not be feasible in the long-term. Some parts of the study area are so significantly impacted by coastal hazards that there is a need for a more holistic adaptation strategy or plan to be developed that considers the viability and feasibility of maintaining the existing uses and values of the locality. In this case, any options that lock in a course of action would be best considered during development of the adaptation strategy. The key affected locations include Shoal

Bay (Option CH073), Foreshore Drive in Salamander Bay (Option CH029) and the Tilligerry Peninsula (Option CH005);

- In other instances, the option was incorporated into another option, for example, due to overlapping locations or for practicality of implementation;
- For a small number of options, the option has already been or is being actioned by Council and does not require consideration in the CMP;
- A small number of options were located outside the study area (i.e. the 'coastal zone' as defied under the CM Act) and were therefore not considered eligible for consideration in the CMP (e.g. the 'Landfill Aftercare and Works Plan' management options (WQ006)).

Of the 92 management options that did not progress to the viability assessment:

- 55 were deemed to be infeasible based on evaluation against the criteria in **Section 5.4**; and
- 37 were assigned to the category 'Other', which applied to management options that:
    - Were removed as a stand-alone option and either incorporated into another option, flagged for consideration under one of the proposed adaptation strategies,
    - Had already been completed by Council, or
    - Were considered 'business as usual' and not necessary to retain in the CMP.

6.2.1 Additional Considerations

Modifications were made to the feasibility assessment and options list based on consultation with the CMP project Steering Committee at Council and NSW DCCEEW. These changes included:

- Provision of additional clarification around the outcome of the feasibility assessment, which was modified to provide for a third type of assessment outcome 'Other'. This outcome was included for those options that are technically not deemed 'infeasible' based on evaluation against the criteria (refer **Section 5.4**), but for which an alternative approach was recommended. This included management options that:
    - Were recommended for removal as a stand-alone option. This applied to management options that were combined with another option because they were the same option, in a similar location, or could otherwise reasonably be combined with, or incorporated into, another feasible management option (e.g. CH069),
    - Were recommended for consideration as part of a more holistic adaptation strategy for the subject locality (e.g. CH070),
    - Had no specific benefit for inclusion in the CMP as they were being progressed under the scope of other ongoing Council activities (e.g. E009), or
    - Management options that had already been completed or were underway (e.g. RA004);
- Additional clarification was also provided in the feasibility assessment regarding justification of the decision to progress (or to not progress) an option to the viability assessment;
- Identification of several options that initially did not progress beyond the feasibility stage that were reviewed and progressed to the viability assessment (e.g. RA043);
- Updates to the identified agency responsible for implementation of some management options arising from clarification of roles and responsibilities of various stakeholders;
- Revisions to the scope or focus of some management options (e.g. 'Implement the Port Stephens Water Quality Monitoring Program for Port Stephens' (WQ003) and 'Investigate risk of tidal ingress

of stormwater outlets and identify outlets requiring tide gates' (CH075), which split into two management options to provide for a staged approach (CH075 and CH081));

- Revision to the cost of implementation (capital and/or annually recurrent costs) for management options, whether arising from additional information provided as a result of the review process or changes to the scope or focus of the management options (e.g. 'The sand management option' (E012)); and
- Where relevant (e.g. where the scope or cost of a management option was revised), the option scoring against each of the threats and the management objectives for the CMP was also revised.

6.3 Viability and Acceptability Assessment Outcomes

The outcomes of the viability and acceptability assessments are presented in **Appendix F** in tabular format. The accompanying maps show the options that progressed to the viability assessment categorised by threat (**RG-00-14**) and a second map showing the outcome of the viability and acceptability assessments for those options (**RG-00-15**).

Of the 61 viable management options that were recommended for the CMP, there were:

- 28 options that address Coastal Hazard Threats;
- 21 options that address Recreation and Access Threats;
- 9 options that address Water Quality Threats;
- 8 options that address Biodiversity Threats; and
- 1 that addresses a Mining and Extractive Industries Threat.

There were:

- 38 options that are categorised as an 'Active Intervention';
- 10 options categorised as 'Planning for Change';
- 8 options that are categorised as 'Alert' options;
- 3 options that 'Avoid Future Impact'; and
- 2 'Emergency Response' options.

Options descriptions are provided for the more complex management options in **Appendix H**.

6.4 Discussion of Options Assessment Outcomes

The decision as to which options should be recommended for inclusion in the CMP will likely be influenced by a range of factors, principally what is feasible with respect to available resources and funding. **Table 6-1** provides a list of the highest ranking management options when ranked by the Total Score and by the Cost Adjusted Score. It is noted that due to space limitations the option descriptions have been shortened and reference should be made to **Appendix F** for the full options descriptions.

A comparison of the outcomes when ranking management options by Total Score versus Cost Adjusted Score was undertaken by arbitrarily taking the top 40 highest ranking options. **Table 6-1** represents the top 40 highest ranked options by Total Score, and includes a number of management options that are also in the top 40 when ranked by Cost Adjusted Score.

However, irrespective of the options ranking (whether by Total Score or Cost Adjusted Score), there are a number of management options that have value and were recommended for consideration for the CMP. These options include:

- Option CH072, the probabilistic coastal erosion assessment for the inner and Outer Port, because there are a number of other options that are dependent upon completion of this option;
- Some options are already being completed by Council through existing programs or Plans of Management and there is therefore value in including them in the CMP for consistency. Such options include:
    - The Mambo Wetlands Plan of Management (E004), and
    - Soldiers Point Littoral Rainforest Management Plan (E005); and
- Others might be low cost or 'no regrets' options that Council or other stakeholders may also wish to include (e.g. to facilitate coordination of coastal management activities, whether internal to Council or across different organisations).

It is noted that two management options proposed for Shoal Bay Beach - 'Beach nourishment' (RA010) and 'Sand carting' (RA011) are mutually exclusive. Both options were included in the viability assessment to enable a comparison of these options on the basis of cost. The total cost of implementation of the 'Beach nourishment' option (RA010) at a cost of $2.863M over the 10 year CMP is slightly higher that of the 'Sand carting' option (RA011), which is costed at $2.585M. However, it is considered that there is an environmental approvals risk associated with the 'Beach nourishment' option (RA010). It is assumed that the addition of sand to the Shoal Bay compartment would increase the net volume of sand transported around Nelson Bay Head, with potential for adverse impacts via smothering of the sponges and soft corals located in the Fly Point – Corrie Island Sanctuary Zone, which may be considered an unacceptable level of impact by Marine Parks. For these reasons, the 'Beach nourishment' management option RA010 is not recommended to proceed to the CMP.

There are a number of other mutually exclusive options relating to specific locations where alternative approaches to addressing the identified management issue were considered; however, none of these progressed through to the viability assessment.

Another change made at this stage was to the management option to 'Provide a back-up generator for the sewage pump station at Shoal Bay' (WQ007). The was discussed with Hunter Water Corporation, who advised that they have an ongoing program to investigate issues resulting in potential sewer overflows and to identify and implement options to address these issues. This program includes Shoal Bay. The wording and costing of management options WQ007 was revised accordingly.

6.4.1 Analysis of Potential Cost Distribution

The annualised cost distribution over the 10 year implementation period of the CMP for the following five different scenarios is provided in **Table 6-2** and **Figure 6-1**:

- **Scenario 1** – if all viable options are adopted as management actions in the CMP, with the exception of the management option for 'Beach nourishment' at Shoal Bay (RA010). For this scenario, 61 management options would be implemented at a total cost over 10 years would be $15.78M;
- **Scenario 2** – cost of implementation of the top 40 highest ranking options based on the Total Score (but excluding RA010). For this scenario, the total cost would be $10.84M over 10 years;
- **Scenario 3** – cost of implementation of the top 50 highest ranking options based on the Total Score (but excluding RA010). For this scenario, the total cost would be $11.60M over 10 years;

- **Scenario 4** - cost of implementation of the top 40 highest ranking options based on the Cost Adjusted Score (but excluding RA010). For this scenario, the total cost over 10 years would be $9.10M; and
- **Scenario 5** - cost of implementation of the top 50 highest ranking options based on the Cost Adjusted Score (but excluding RA010). For this scenario, the total cost over 10 years would be $12.18M.

It is noted that this includes the total cost of implementation, including options that may be implemented by agencies other than Council. In addition, the portion of the cost that may potentially be sourced via the various grant programs available is also included in the total cost. If successful with a grant application, the total cost to Council would be much lower.

Irrespective, the purpose of this analysis is simply to consider the key factors that would influence the total cost of implementation of the CMP over the 10 years.

The total cost of implementation of all management options (i.e. Scenario 1) is high due to the large number of options that would be implemented. Scenario 3 has a higher cost of implementation over 10 years due to the additional 10 options included when compared to Scenario 2.

Scenario 4 has a lower cost of implementation when compared to Scenario 2, and Scenario 5 has a higher cost than Scenario 3. This shows that the costs associated with a management option isn't the biggest determinant of total cost of the CMP. Rather, the total number of options considered for inclusion in the CMP is the biggest driver of cost once the risk mitigation and management objectives scores are taken into account.

Table 6-1 shows the top 40 highest ranking management options when ranked by Total Score. It also includes many of the top 40 highest ranking options when ranked by Cost Adjusted Score.

Given the cost of all scenarios is similar, the project Steering Committee considered proceeding with Scenario 1, which includes all options that were evaluated in the viability assessment (but excluding the 'Beach nourishment' option at Shoal Bay (RA010)). As alternatives, the Steering Committee also considered the other four scenarios for the CMP (all of which have a slightly lower cost of implementation) with the following modifications:

- Inclusion of additional options that have no additional cost (e.g. CH006 and RA003);
- Inclusion of additional 'investigation and design' options that would enable inclusion of additional options in the next CMP (i.e. for 2035-2045), such as 'Investigate options to protect Shoal Bay Road' (CH014) and 'Priority options for Sandy Point from the Management Plan for Sandy Point / Conroy Park' (CH022). It is noted that these two options address threats rated as 'very high' in the risk assessment and should therefore be carefully considered for inclusion in the CMP;
- Inclusion of additional options that comprise a priority activity for Council or the community, or address a potential liability for Council (e.g. 'Maintenance to rock revetment' (CH023), 'Sand carting at Sandy Point / Conroy Park' (RA016));
- Or that are relatively low-cost and address existing and future risks, such as 'Tide gates for stormwater outlets' (CH075).

Table 6-1 Highest ranking management options

Option ID	Key Threat Addressed	Management Option	Total Score	Rank by Total Score	Cost Adjusted Score	Rank by Cost Adjusted Score	No Regrets Option?
CH073	All CH Threats	Develop an adaptation strategy for the Shoal Bay precinct.	19	1	6	20	Yes
CH082	All CH Threats	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	17	2	17	1	Yes
CH009	CH Threat 2	Install an additional Coast Snap monitoring point at Fingal Beach.	17	2	9	11	Yes
WQ003	All WQ Threats	Implement a Water Quality Monitoring Program focussed on risk to aquatic recreation. As a secondary objective, the monitoring should evaluate catchment pollutant inputs.	17	2	20	6	Yes
E018	BD Threat 2	Prepare a new, updated Plan of Management for Mambo Wetlands.	16	5	8	16	Yes
CH029	CH Threat 5	Prepare an adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the plan will be an agreed and costed adaptation pathway.	16	5	5	26	Yes
CH072	CH Threat 2	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	16	5	5	26	Yes
WQ002	All WQ Threats	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	15	8	15	2	Yes
WQ004	BD Threat 1	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	15	8	15	2	No
CH003	All CH Threats	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	15	8	5	26	Yes
RA012	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	15	8	5	26	Yes

Option ID	Key Threat Addressed	Management Option	Total Score	Rank by Total Score	Cost Adjusted Score	Rank by Cost Adjusted Score	No Regrets Option?
E012	RA Threat 2	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	16	**8**	4	**36**	Yes
CH011	All CH Threats	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	14	**13**	14	**4**	Yes
DI001	ME Threat 1	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	14	**13**	7	**17**	Yes
CH001	All CH Threats	Develop and implement a coastal hazard monitoring strategy.	14	**13**	5	**26**	Yes
WQ009	All WQ Threats	Beachwatch monitoring program for recreational water quality at ocean beaches (continued program).	13	**16**	13	**5**	No
HE001	RA Threat 2	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	13	**16**	7	**17**	Yes
E013	RA Threat 2	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	12	**18**	12	**6**	Yes
E014	WQ Threat 1	Engage with NSW DPI with the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	12	**18**	12	**6**	Yes
E017	RA Threat 2	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	12	**18**	12	**6**	
CH074	RA Threat 2	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	12	**18**	6	**20**	Yes
E008	BD Threat 1	Conduct an ecological survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	12	**18**	6	**20**	Yes

Option ID	Key Threat Addressed	Management Option	Total Score	Rank by Total Score	Cost Adjusted Score	Rank by Cost Adjusted Score	No Regrets Option?
CH005	CH Threat 5	Prepare an adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the plan will be an agreed and costed adaptation pathway.	12	**18**	4	**36**	Yes
E001	BD Threat 2	Continue to support pest and weed control management activities on Council land in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program.	12	**18**	4	**36**	Yes
RA034	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	12	**18**	4	**36**	Yes
CH007	CH Threat 3	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	12	**18**	3	**47**	Yes
RA002	RA Threat 1	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	11	**27**	11	**9**	Yes
RA001	RA Threat 2	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	11	**27**	6	**20**	Yes
E002	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	11	**27**	4	**36**	Yes
E011	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	11	**27**	4	**36**	No
RA030	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	10	**31**	5	**26**	Yes

Option ID	Key Threat Addressed	Management Option	Total Score	Rank by Total Score	Cost Adjusted Score	Rank by Cost Adjusted Score	No Regrets Option?
WQ005	WQ Threat 1	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	10	31	5	26	Yes
CH079	CH Threat 3	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	10	31	3	47	Yes
E004	BD Threat 2	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time.	10	31	3	47	Yes
HE002	BD Threat 2	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners.	10	31	3	47	Yes
E005	BD Threat 2	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021).	9	36	9	11	Yes
E019	BD Threat 2	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	9	36	9	11	Yes
WQ010	WQ Threat 5	Support the community to dispose of recreational fishing waste appropriately.	9	36	9	11	Yes
E016	RA Threat 2	Encourage local volunteer groups to support dune rehabilitation activities.	9	36	5	26	Yes
RA017	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	9	36	5	26	Yes

Table 6-2 Annualised cost of implementation over CMP*

Scenario	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total Cost Over 10 Years
1: All recommended options	$1,845,100	$3,200,611	$2,042,811	$1,593,061	$1,144,403	$1,427,153	$1,471,353	$1,017,728	$1,017,728	$1,017,728	$15,777,675
2: Top 40 Ranked by Total Score	$1,349,600	$1,756,000	$1,173,200	$1,323,450	$911,042	$1,006,042	$906,042	$806,042	$806,042	$806,042	$10,843,500
3: Top 50 Ranked by Total Score	$1,483,600	$1,877,000	$1,274,200	$1,365,950	$992,292	$1,132,542	$943,742	$843,742	$843,742	$843,742	*$11,600,550*
4: Top 40 Ranked by Cost Adjusted Score	$1,322,600	$1,119,000	$1,024,200	$1,190,950	$817,292	$865,792	$765,792	$665,792	$665,792	$665,792	*$9,103,000*
5: Top 50 Ranked by Cost Adjusted Score	$1,658,100	$1,927,611	$1,324,811	$1,416,561	$1,042,903	$1,141,403	$991,403	$891,403	$891,403	$891,403	*$12,177,000*

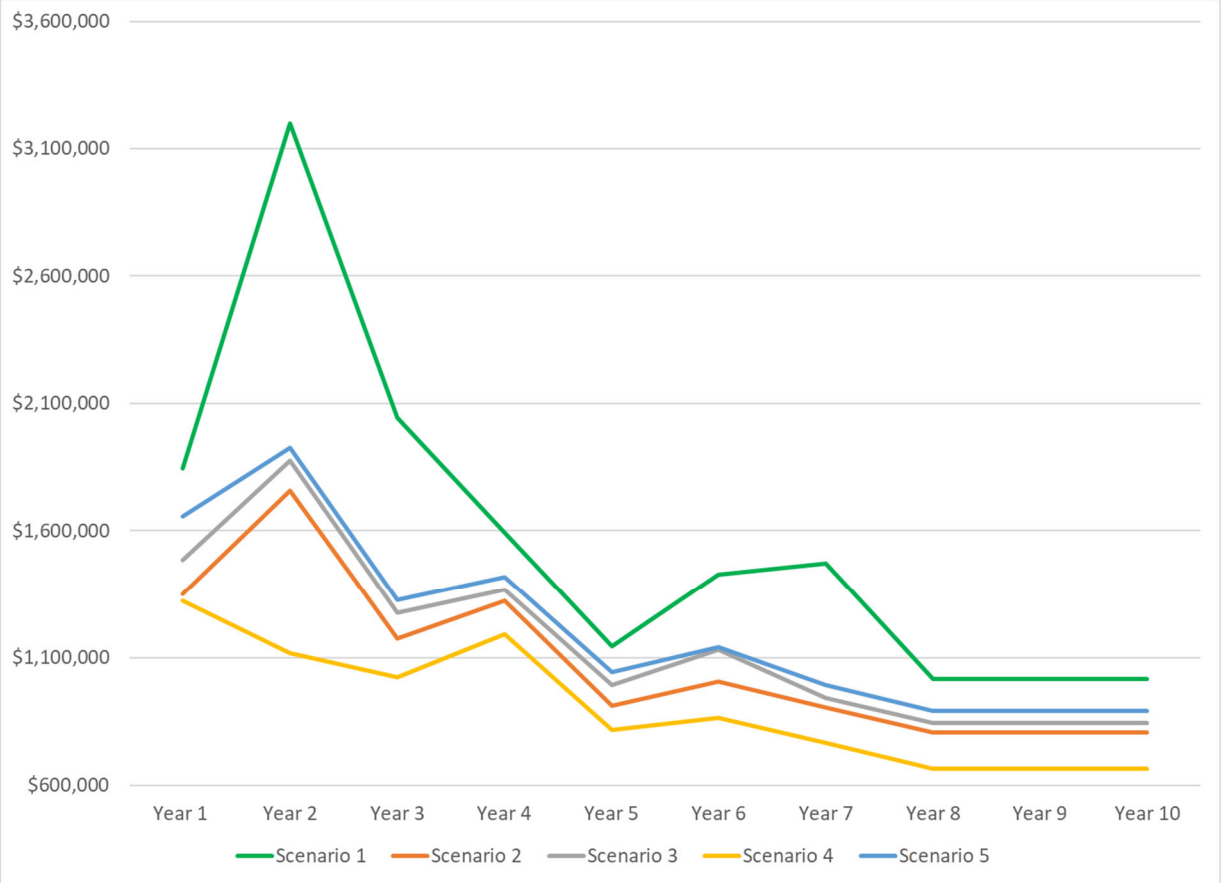

Figure 6-1 Annualised cost of implementation for each scenario

It is also useful to consider the geographical spread and different types of options that would be included in the CMP based on the different expenditure scenarios listed above. Reference should be made to the map of site-specific management options that progressed to the viability assessment, provided in **Appendix F** along with the accompanying detailed options table for further information on where management options were proposed, the capital and annually recurrent costs of implementation of each option and timeframe proposed for implementation.

6.4.2 Options Considered for Cost-Benefit Assessment

A discussed was held between Council's CMP project team and NSW DCCEEW to consider whether any of the management options should be subjected to CBA. In accordance with the requirements of the CM Manual, a CBA is typically required for any options that are costly (e.g. >$1M), complex or for which there is a high risk of implementation or effectiveness.

The following management options were specifically discussed with respect to the need for a detailed CBA:

- Foredune stabilisation works for 'Stockton Beach' (CH007),
- 'Sand carting for Shoal Bay Beach' (RA011), and
- The 'Sand management option' (E012).

A decision made to not proceed with a CBA for any of these (or any other) management options. It was considered that, while a CBA would be useful demonstrate economic benefits and justify inclusion of the option in the CMP, there was no specific driver (e.g. need for a distribution analysis) to do any CBAs.

7 Conclusions and Recommendations

7.1 Recommendations for the CMP

The final step in Stage 3 was for Council's CMP Steering Committee to review the final list of viable management options (refer **Appendix F**) and determine which options they recommend be included as management actions in the CMP. The majority of viable management options were recommended for adoption in the CMP. Options that have no additional cost, 'investigation and design' options, priority options and lower cost/no regrets options were included as advised by the Steering Committee.

However, some management options were not recommended for the CMP. This process was informed by consideration of the cost of implementation of the management option and the potential benefits that might be realised. Viable management options that were not recommended for the CMP included six management options, as follows:

- As previously discussed, the 'Beach nourishment' option (RA010) for Shoal Bay Beach was excluded on the basis of the high cost and uncertainty around the approvals (and noting also this option and the 'Sand carting' option (RA011) are mutually exclusive);
- One management option that was considered to no longer be required due to changes in related management options (option WQ001);
- Four management options that were not recommended as they were considered a lower priority for Council within their available resources and considering the marginal benefits that would be accrued (options RA019, RA038, RA041, and RA043)

The rationale for excluding these options from the CMP is provided in **Appendix F.**

One management option (CH007) is still being discussed with the implementing agencies and will be confirmed during development of Stage 4.

The final list of 60 management options recommended for inclusion as management actions in the CMP (but excluding Option CH007, which is yet to be confirmed) is provided in **Appendix G** in tabular format with an accompanying map (**RG-00-11**).

Of the 60 viable management options recommended for inclusion in the CMP, there were:

- 26 options that address Coastal Hazard Threats;
- 17 options that address Recreation and Access Threats;
- 8 options that address Water Quality Threats;
- 8 options that address Biodiversity Threats; and
- 1 that addresses a Mining and Extractive Industries Threat.

There were:

- 37 options that are categorised as an 'Active Intervention';
- 9 options categorised as 'Planning for Change';
- 8 options that are categorised as 'Alert' options;
- 4 options that 'Avoid Future Impact'; and
- 2 'Emergency Response' options.

The total cost of implementation of the CMP over the first 10 years would be $14.45M. This includes all options, irrespective of the implementing agency, and does not take into account the potential to obtain grants to offset some of the cost.

7.2 Next Steps

Following finalisation of this Stage 3 Report, the CMP will progress to Stage 4 of the CMP process and the following activities will be undertaken:

- Development of a business plan 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;
- Obtaining stakeholder agreement in writing for any management actions for which they are primarily (or hold shared) responsibility for implementing, or which are proposed on land for which they are the identified landowner;
- Preparation of the CZEAS;
- Initial review of the draft CMP and CZEAS by the Steering Committee and Stakeholder Reference Group;
- Public exhibition of the draft CMP and CZEAS;
- Updating of the CMP in response to submissions received. This may result in modifications to the management actions in the CMP, the addition of new management actions and updating of the acceptability scoring based on community and stakeholder feedback received;
- Adoption of the Final CMP and CZEAS by Council; and
- Certification of the final CMP by the Minister, after which it will have statutory effect and proceed to Stage 5 of the CMP process, the implementation phase. The CMP and the progress of the management actions will be reviewed periodically to ensure the actions remain relevant and the implementation of the plan is being achieved.

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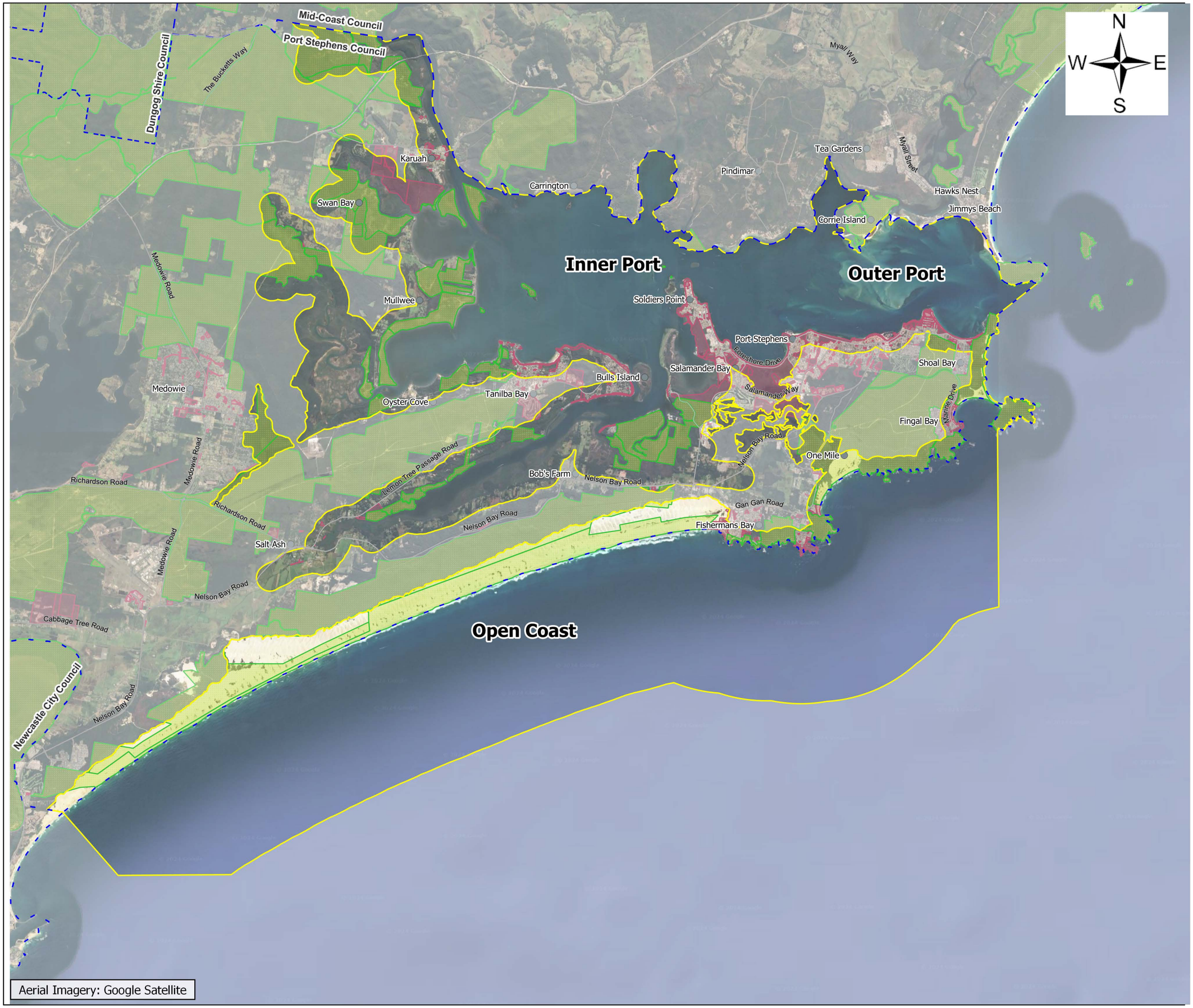
Appendix A

Compendium of Maps



PORT STEPHENS COUNCIL

RG-00-01

Port Stephens Coastal Management Program

Study Area

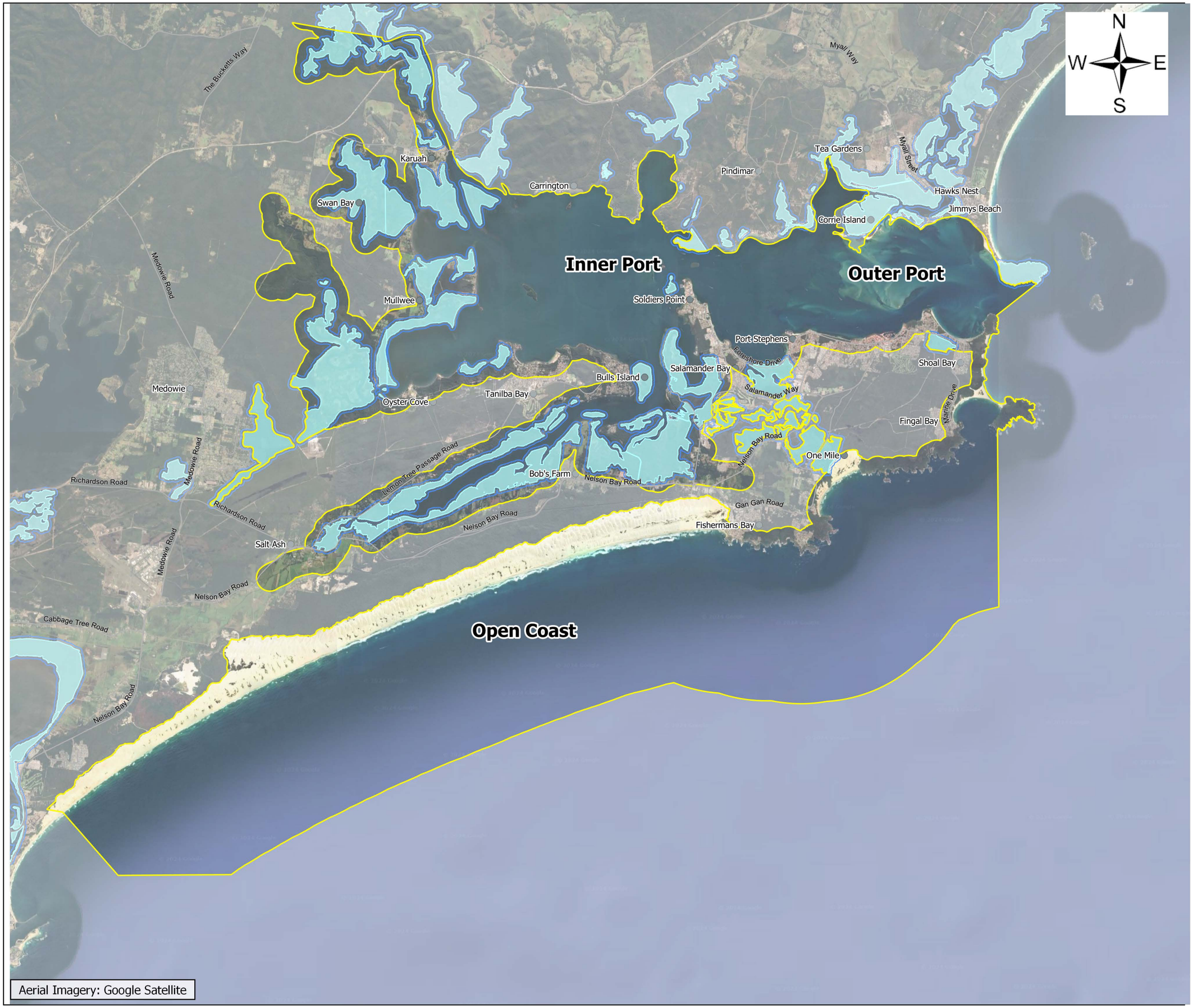
Legend

- Study Area
- LGA Boundary
- National Parks and Nature Reserves
- Land Under Care and Control of Council

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-02

Port Stephens Coastal Management Program

Coastal Wetlands CMA

Legend

- Study Area

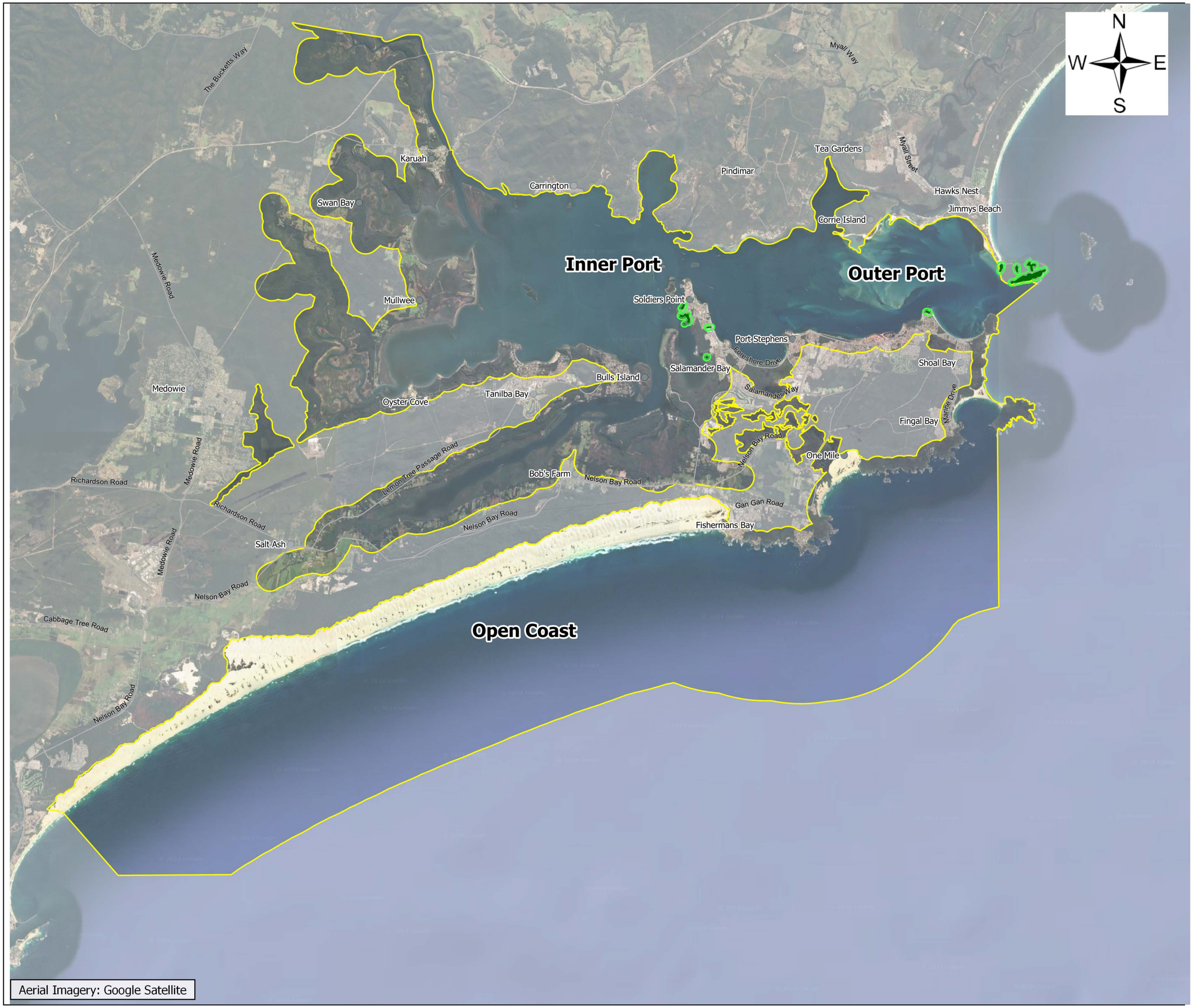
Coastal Wetlands CMA

- Coastal Wetlands
- Coastal Wetland Proximity Area

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-03

Port Stephens Coastal Management Program

Littoral Rainforest CMA

Legend

- Study Area

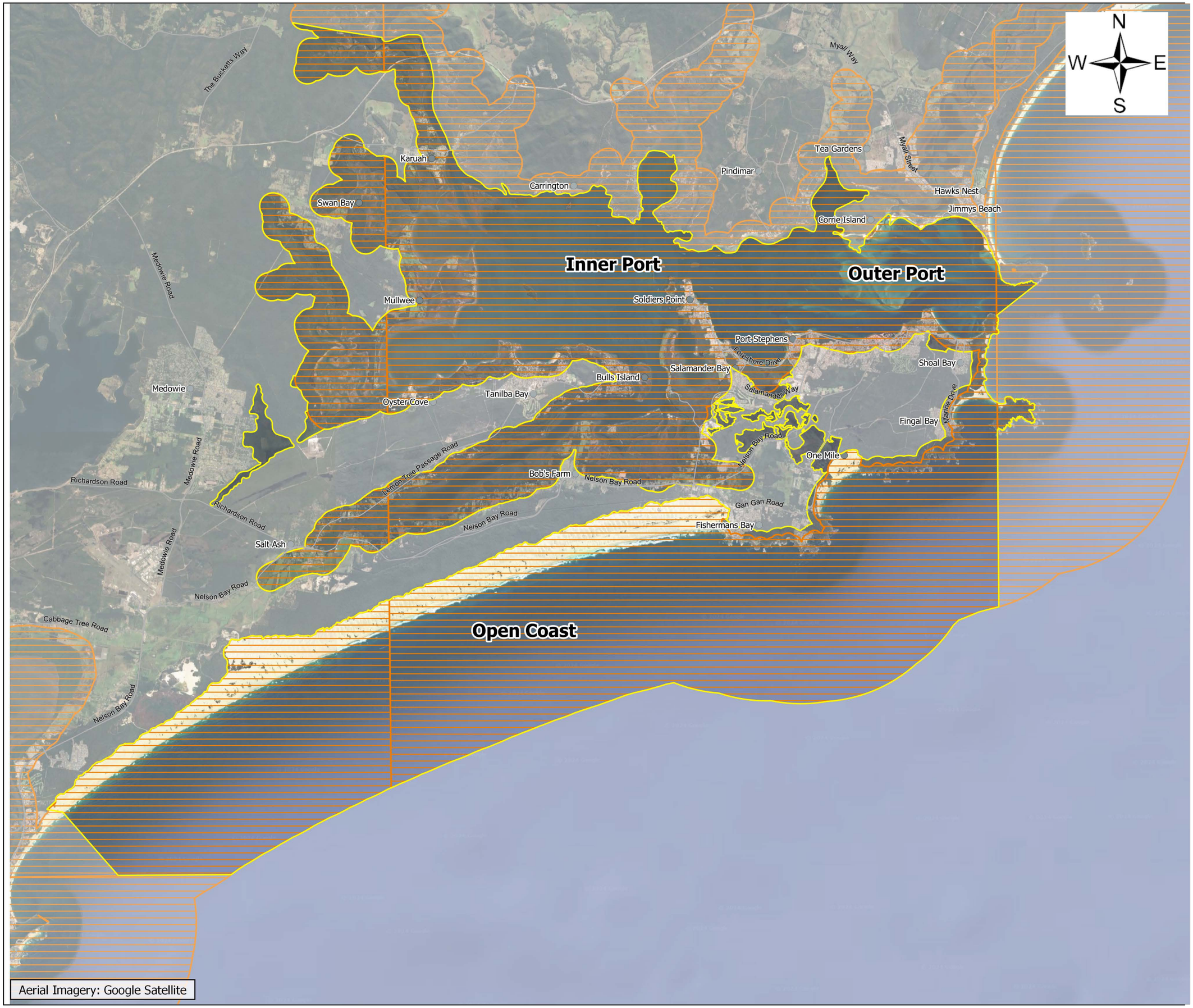
Littoral Rainforest CMA

- Littoral Rainforest
- Littoral Rainforest Proximity Area

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-04

Port Stephens Coastal Management Program

Coastal Environment Area

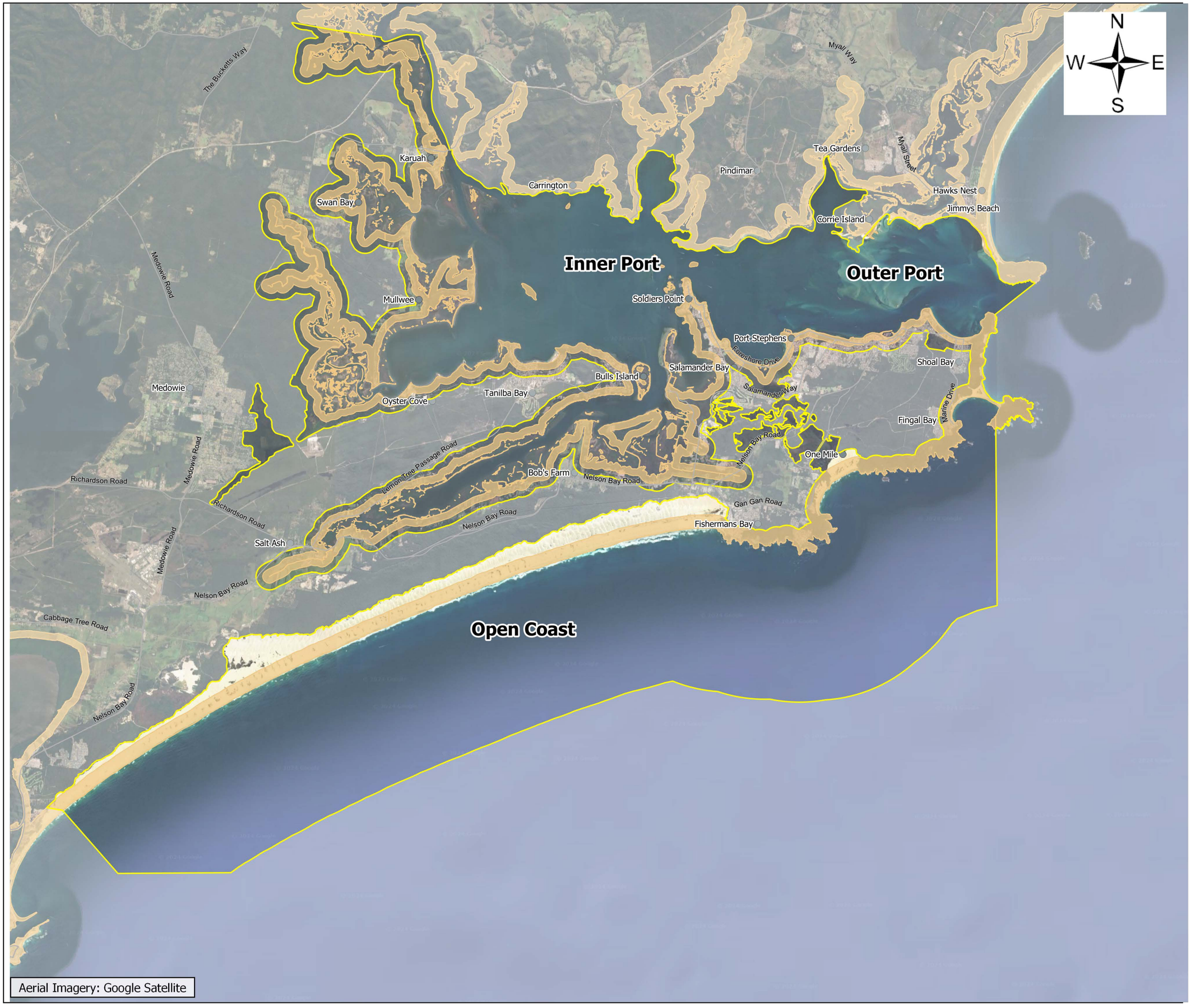
Legend

- Study Area
- Coastal Environmental Area

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-05

Port Stephens Coastal Management Program

Coastal Use Area

Legend

- Study Area
- Coastal Use Area

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

N
W E
S

Myall Lakes coast

The Buckets Way
Myall Way
Karuah
Carrington
Pindimar
Tea Gardens
Myall Street
Hawks Nest
Jimmys Beach
Swan Bay
Corrie Island
Medowie Road
Inner Port
Outer Port
Mullwee
Port Stephens
Soldiers Point
Port Stephens
Foreshore Drive
Shoal Bay
Salamander Bay
Bulls Island
Salamander Way
Medowie
Tanilba Bay
Oyster Cove
Fingal Bay
Marine Drive
Nelson Bay Road
One Mile
Medowie Road
Lemon Tree Passage Road
Bob's Farm
Nelson Bay Road
Anna Bay
Richardson Road
Gan Gan Road
Richardson Road
Fishermans Bay
Salt Ash
Medowie Road
Nelson Bay Road
Cabbage Tree Road
Open Coast
Stockton Bight
Nelson Bay Road
Newcastle coast
Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-06

Port Stephens Coastal Management Program

Coastal Sediment Compartments

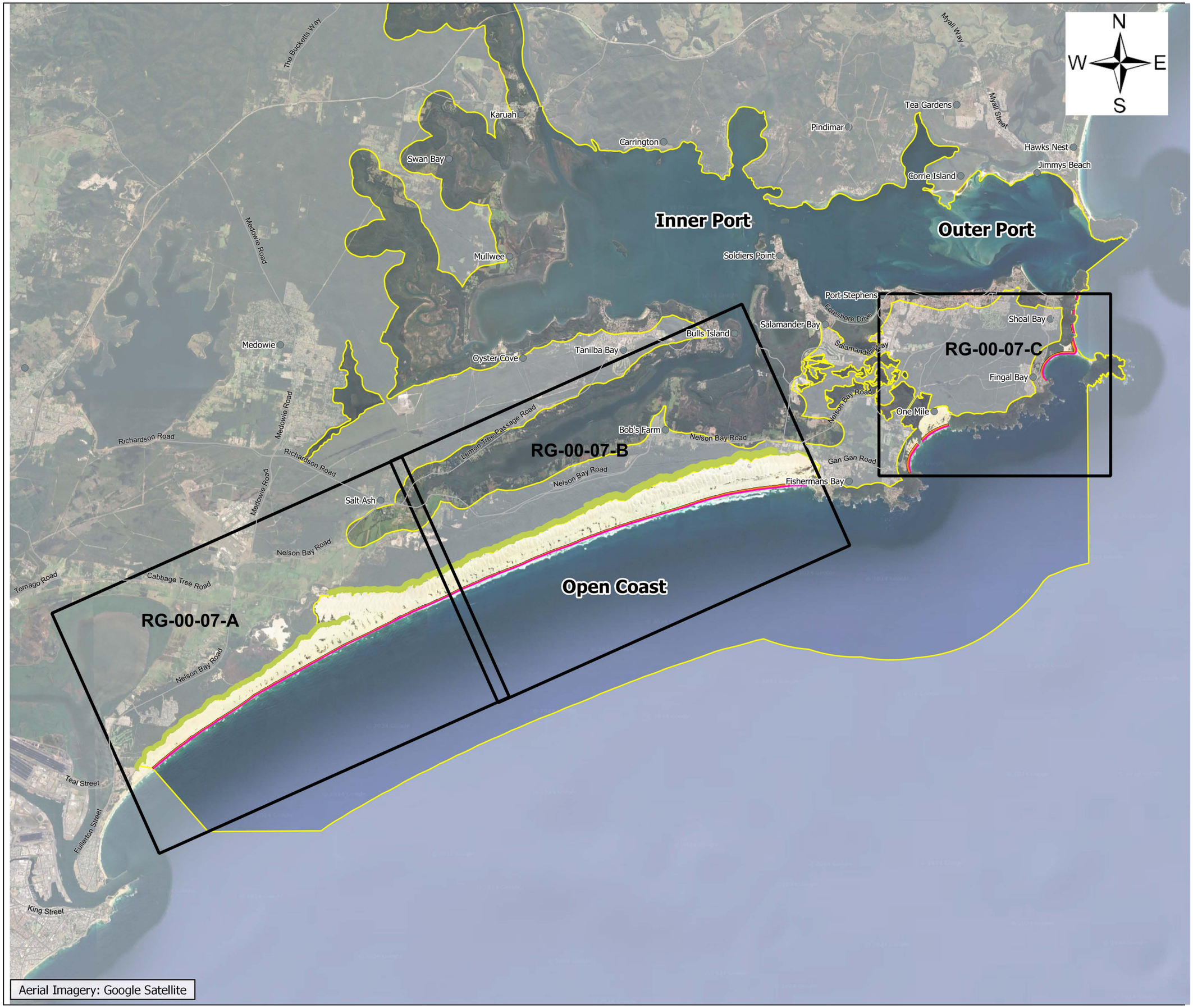
Legend

- Study Area
- Secondary Sediment Compartments
- Primary Sediment Compartments

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-07

Port Stephens Coastal Management Program

Coastal Erosion and Dune Transgression Hazard Lines for the Open Coast

Legend

- Study Area

Coastal Hazard Extents (Source: BMT, 2021)

- Coastal Erosion Hazard - Present Day
- Coastal Erosion Hazard - 2120
- Dune Transgression - 2070

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 26/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

PORT STEPHENS COUNCIL

RG-00-07-A

Port Stephens Coastal Management Program

Coastal Erosion and Dune Transgression Hazard Lines for the Open Coast

Legend

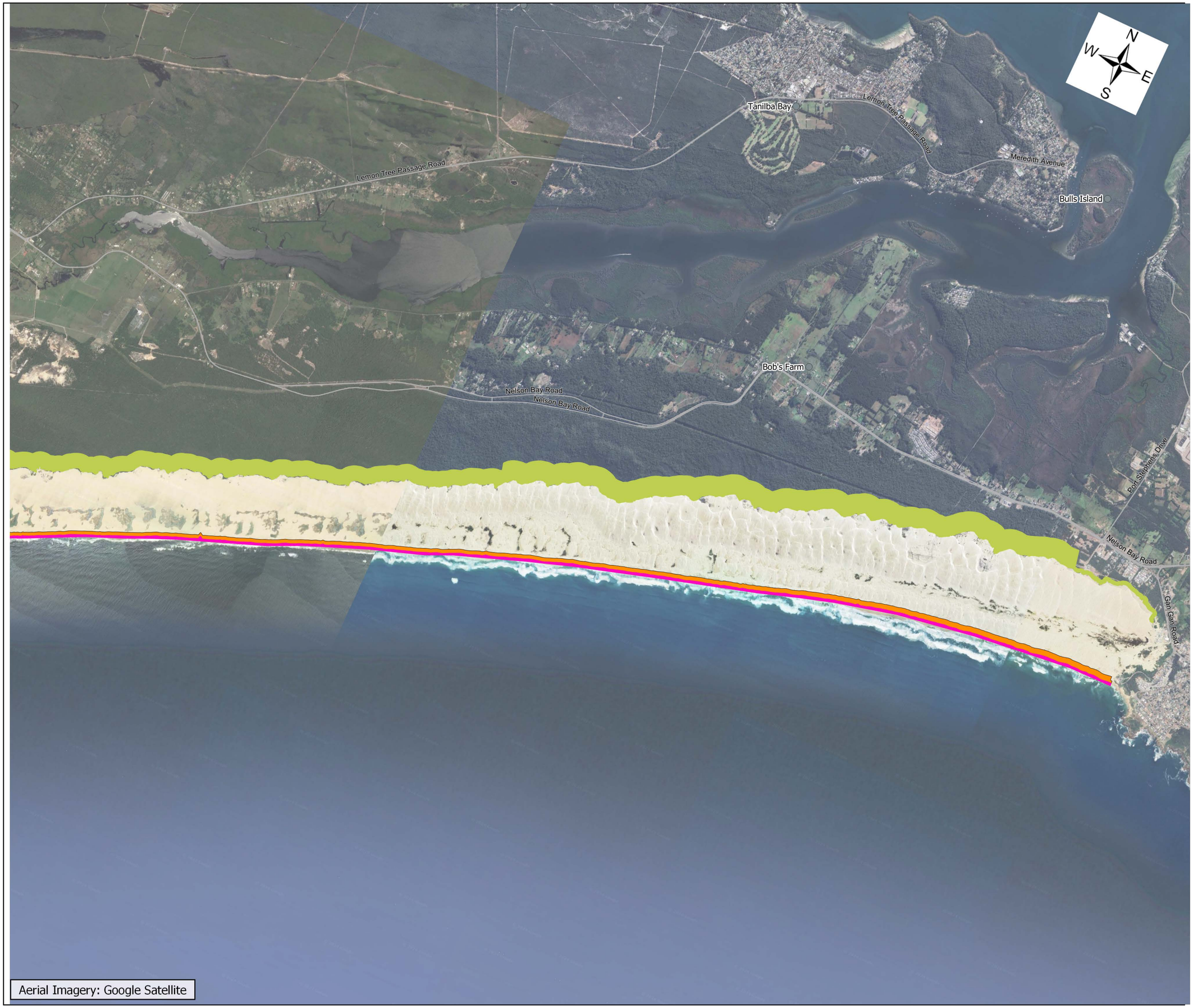
Coastal Hazard Extents (Source: BMT, 2021)

- Coastal Erosion Hazard - Present Day
- Coastal Erosion Hazard - 2120
- Dune Transgression - 2070

0 0.4 0.8 1.2 km

Job Number: J1702
Scale : 1:45000@A3
Date : 26/02/2024
Revision : 03
Created by : SJW
Coordinate System : GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-07-B

Port Stephens Coastal Management Program

Coastal Erosion and Dune Transgression Hazard Lines for the Open Coast

Legend

Coastal Hazard Extents (Source: BMT, 2021)

- Coastal Erosion Hazard - Present Day
- Coastal Erosion Hazard - 2120
- Dune Transgression - 2070

0 0.4 0.8 1.2 km

Job Number: J1702
Scale : 1:45000@A3
Date : 26/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

PORT STEPHENS COUNCIL

RG-00-07-C

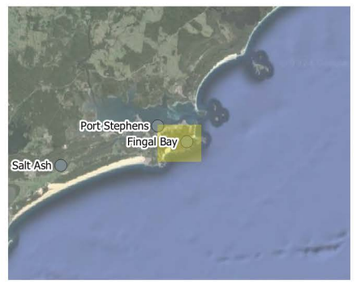
Port Stephens Coastal Management Program

Coastal Erosion and Dune Transgression Hazard Lines for the Open Coast

Legend

Coastal Hazard Extents (Source: BMT, 2021)

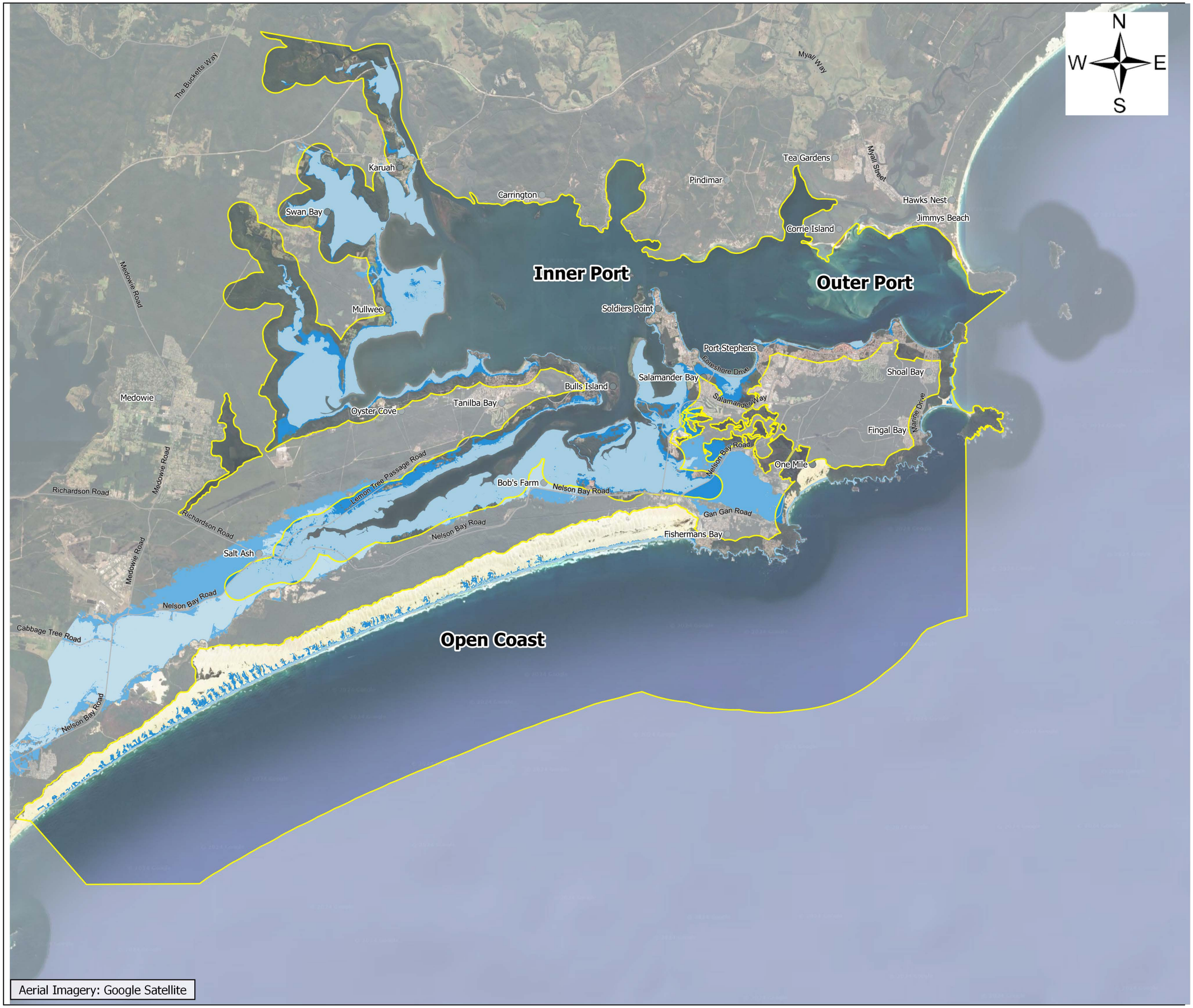
- Coastal Erosion Hazard - Present Day
- Coastal Erosion Hazard - 2120



0 0.2 0.4 0.6 km

Job Number: J1702
Scale : 1:25000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System : GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-08

Port Stephens Coastal Management Program

Coastal Inundation Extents for the 20-year ARI Storm Event

Legend

- Study Area

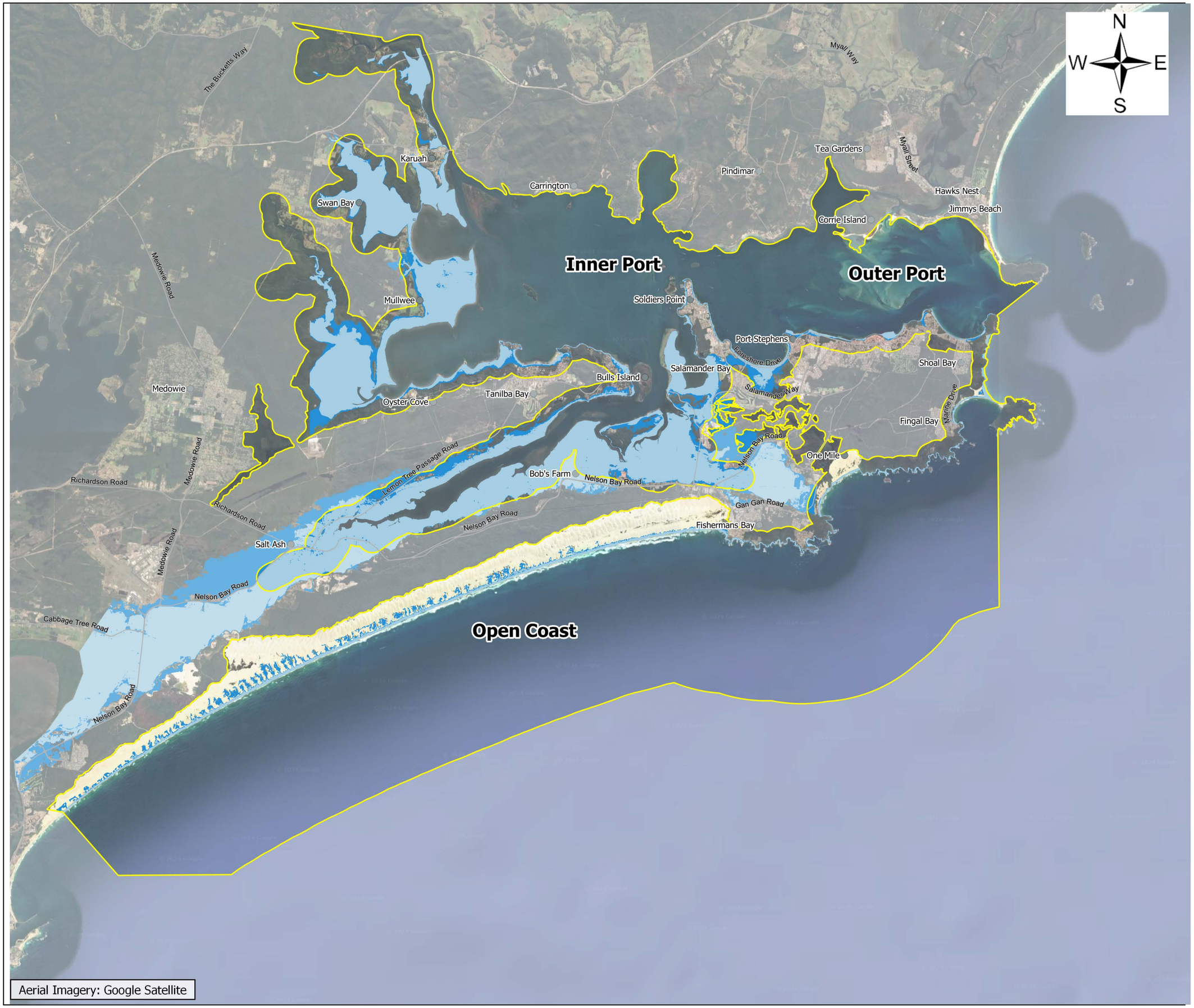
Coastal Hazard Extents (Source: BMT, 2021)

- 20-year ARI Coastal Inundation - Present Day
- 20-year ARI Coastal Inundation - 2120

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System : GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-09

Port Stephens Coastal Management Program

Coastal Inundation Extents for the 100-year ARI Storm Event

Legend

- Study Area

Coastal Hazard Extents (Source: BMT, 2021)

- 100-year ARI Coastal Inundation - Present Day
- 100-year ARI Coastal Inundation - 2120

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System : GDA2020 / MGA zone 56

Rhelm

N
W E
S

Inner Port
Outer Port
Open Coast

The Buckets Way
Myall Way
Karuah
Swan Bay
Carrington
Pindimar
Tea Gardens
Myall Street
Hawks Nest
Jimmys Beach
Corrie Island
Medowie Road
Mullwee
Soldiers Point
Port Stephens
Foreshore Drive
Salamander Bay
Salamander Way
Shoal Bay
Bulls Island
Tanilba Bay
Oyster Cove
Medowie
Fingal Bay
Marine Drive
Nelson Bay Road
One Mile
Richardson Road
Lemon Tree Passage Road
Bob's Farm
Nelson Bay Road
Gan Gan Road
Fishermans Bay
Salt Ash
Cabbage Tree Road

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-10

Port Stephens Coastal Management Program

Tidal Inundation Extents

Legend

- Study Area

Coastal Hazard Extents (Source: BMT, 2021)

- Tidal Inundation - Present Day
- Tidal Inundation - 2120

0 1 2 3 km

Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

Appendix B

Review of Land Use Planning & Development Controls

Review of Land Use Planning & Development Controls

This appendix provides a review of the existing land use planning and development controls relating to management of risk from coastal hazards, including State and local government environmental planning instruments and legislation.

The review was undertaken to assist Council in considering an appropriate means of managing the risk to life and property from coastal hazards for the Port Stephens LGA through the CMP process.

1 What is the Coastal Zone?

Section 5 of the NSW *Coastal Management Act 2016* (CM Act) defines the coastal zone as *'the area of land comprised of the following coastal management areas-*

(a) the coastal wetlands and littoral rainforests area,

(b) the coastal vulnerability area,

(c) the coastal environment area,

(d) the coastal use area.'

These coastal management areas are then mapped under the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP), with the exception of the coastal vulnerability area.

Under the *Environmental Planning and Assessment Act 1979* (EP&A Act), a local Council may prepare a planning proposal to amend the extent of any of these coastal management areas, and in the case of the coastal vulnerability area, to propose an area to mapped as such under the Resilience and Hazards SEPP.

2 Land Use Zoning the Port Stephens Coastal Zone

This section of the appendix provides a high level review of the land use zoning of the coastal zone and comments on its appropriateness in the context of the objectives for the objectives of the coastal management areas mapped under the Resilience and Hazards SEPP.

2.1 Land Vulnerable to Key Coastal Hazards

At the time of preparation of this report, there was no coastal vulnerability area adopted for the study area. However, coastal hazard investigations have been completed for the study area in Stage 2 of the CMP (refer BMT, 2021a), these studies have mapped the extent of the following key coastal hazards for the present day (2020) and under projected climate change conditions for 2040, 2070 and 2120:

- Tidal inundation;
- Coastal inundation (without consideration of wave runup/overtopping); and
- Coastal erosion.

For the purposes of this review, the hazard extents for the 'likely', 2120 scenario were overlaid on the land use zoning under the Port Stephens Local Environmental Plan 2013 (the LEP).

A summary of the total area of different land use zones that fall within the tidal inundation extent and coastal erosion extent (which covers the open coast only) is provided in **Table 1**. The analysis shows that up to 10,000 hectares of affected zoned lands at 2120 (noting the assessment does not include unzoned land).

At the time this analysis was undertaken the land use zonings in **Table 1** were applicable. However, since that time, all B zones were translated into new, equivalent zones as part of the NSW Employment Zones Reform. The relevant translations (equivalent zones) for the Port Stephens LGA are provided in the table with the former zoning provided in brackets.

Table 1 Land Affected by Key Coastal Hazards

Land Use Zoning	Almost Certain* 2020 HAT Inundation Extent		Likely^ 100-year ARI Coastal Inundation Extent				Likely^ Coastal Erosion Extent	
			2020		2120			
	Area (ha)	% of Total Area	Area (ha)	% of Total Area	Area (ha)	% of Total Area	2020	2120
E1 Local Centre (formerly B1 - Neighbourhood Centre)	0.23	0.0%	2.02	0.0%	5.52	0.1%	-	-
E1 Local Centre (formerly B2 - Local Centre)	0.67	0.0%	2.92	0.0%	5.00	0.0%	-	-
E3 Productivity Support (formerly B5 - Business Development)	-	0.0%	0.30	0.0%	6.85	0.1%	-	-
B7 – Business Park[2]	-	0.0%	10.23	0.1%	45.39	0.4%	-	-
C1 - National Park and Nature Reserves	855.49	28.7%	1594.24	20.0%	2,208.06	20.6%	67.22	238.95

[2] The B7 Zone continues to apply to this location. The subject land was not part of the NSW Employment Zones Reform because it was identified to be part of the (now deferred) Williamtown Special Activation Precinct.

Land Use Zoning	Almost Certain* 2020 HAT Inundation Extent		Likely^ 100-year ARI Coastal Inundation Extent				Likely^ Coastal Erosion Extent	
			2020		2120			
	Area (ha)	% of Total Area	Area (ha)	% of Total Area	Area (ha)	% of Total Area	2020	2120
C2 - Environmental Conservation	565.24	19.0%	846.68	10.6%	1,275.32	11.9%	1.36	13.41
C3 - Environmental Management	97.67	3.3%	155.43	2.0%	185.59	1.7%	-	-
C4 - Environmental Living	-	0.0%	35.61	0.4%	70.52	0.7%	-	-
E4 General Industrial (formerly IN2 - Light Industrial)	-	0.0%	0.32	0.0%	6.04	0.1%	-	-
W4 Working Waterfront (formerly IN4 - Working Waterfront)	2.06	0.1%	11.00	0.1%	15.88	0.1%	-	-
R2 - Low Density Residential	0.72	0.0%	42.83	0.5%	127.77	1.2%	-	0.02
R3 - Medium Density Residential	-	0.0%	-	0.0%	2.70	0.0%	-	-
R5 - Large Lot Residential	-	0.0%	3.48	0.0%	7.94	0.1%	-	-
RE1 - Public Recreation	13.44	0.5%	62.06	0.8%	88.88	0.8%	1.73	7.93
RE2 - Private Open Space	2.35	0.1%	8.94	0.1%	80.11	0.7%	-	-
RU2 - Rural Landscape	935.51	31.4%	3,869.28	48.6%	4,954.18	46.3%	-	-
RU3 - Forestry	0.86	0.0%	7.60	0.1%	11.12	0.1%	-	-
SP1 - Special Activities	0.29	0.0%	1.09	0.0%	57.91	0.5%	-	-
SP2 - Infrastructure	277.97	9.3%	968.40	12.2%	1,212.84	11.3%	-	-
W2 - Recreational Waterways	223.90	7.5%	340.36	4.3%	341.95	3.2%	-	-
TOTAL	**2,976.40**	**100%**	**7,962.79**	**100%**	**10,709.56**	**100%**	**70.32**	**260.30**

*Almost certain = 95% of model simulations suggest HAT will reach this depth, Likely = 50% of model simulations suggest the 100-year ARI water level will reach this depth. ^Corresponds to a setback distance that is the most likely to be reaches (50% of model simulations).

The majority of land subject to coastal erosion hazard (as mapped by BMT WBM, 2021a) falls within the National Park Estate and is zoned C1 (refer **Table 1**). It is noted, however, that coastal erosion extents have not been mapped for the portions of the Port Stephens estuary referred to as 'Inner Port and Outer Port' and it is likely that there is residential land subject to coastal erosion in these areas (e.g. land zoned R2).

Considering the land affected by the present day HAT inundation extent, there is a large swathe of land extending west from Port Stephens Drive and north of Nelson Bay Road to Salt Ash and either side of Tilligerry Creek that is subject to tidal inundation. This includes land zoned RU2 (31.4%), C1 (28.7%), C2 (19.0%), summing to 79.1% of all land within the inundation extent (refer **Table 1**). The RU2 – Rural landscape lands within the inundation extent includes some rural residential properties and farmland. It appears that the buildings on some properties are on an elevated location above the inundation extent, but many others are not. There are the same land use types falling with the present day HAT

inundation extent around Twelve Mile Creek and up to Swan Bay, around Reedy Creek and up to Karuah and thereafter the Pacific Highway. This includes a large area (277.97 ha) of land zoned SP2 – Infrastructure. There is very little residential (0.72 ha of R2 land) land that would fall within the present day HAT inundation extent.

The present day 100-year ARI coastal inundation extent captures larger areas of land zoned RU2 located in Bobs Farm and One Mile (3,869.28 ha compared with 935.51 ha for the present day HAT extent), corresponding to 48.6% of the total area subject to inundation. Land zoned R2 (42.3 ha) in Corlette, Salamander Bay–Soldiers Point and Taylors Beach also falls within the tidal inundation extent. Otherwise, the land subject to inundation under the 100-year ARI coastal inundation extent is largely zoned for public recreation, conservation or environmental management (RE1, RE2, C1, C2 or C3), which has inherently lower risk to public safety from coastal hazards.

For the 2070 planning horizon, the HAT inundation extent extends to land located at Rookes Point and around to Wundabalaynbah Point is within the hazard extent (zoned R2, C2 and RE1). There are also large areas of land inundated around the Karuah River and Twelve Mile Creek (Oyster Cove and Mullwee), all the way north to the Pacific Highway north of Karuah. This includes land zoned W4, R2 (in Karuah), RU2, SP2, C1 and C2.

Generally speaking, the present day (2020) 100-year ARI tidal inundation extents are similar to those for the 2120 HAT inundation extents. In the 2120 planning horizon there are large areas of land subject to inundation on HAT (10,709.56 ha; refer **Table 1**). This includes a large area of land extending from north of Anna Bay to Tilligerry Creek and Bobs Farm, and adjacent to Tilligerry Creek. In 2120 the HAT inundation extent extends west of Nelson Bay Road and towards Salt Ash, and to the east and north of Lemon Tree Passage Road, encompassing land that is not inundated in the 2070 scenario. Residential land R2 land located in Corlette, Salamander Bay–Soldiers Point and Taylors Beach falls within the inundation extent, as does some land zoned R3 in Nelson Bay west of Beach Road.

The zoning of land falling within the 2120 100-year ARI tidal inundation extent is largely comprised of RU2 (4,954.18 ha or 46.3% of the total), as well as C1 (20.6%) and C2 (11.9%) and areas of C3 and C4. There is also some land zoned B7 located southwest of Newcastle Airport that is inundated, 1,212.84 ha of SP2 land in Salt Ash, and Defence land south and east of Nelson Bay Road. The Salamander Bay Waste Transfer Centre (zoned E4) also falls within the 2120 HAT inundation extent.

Key Findings

Consistent with the management objectives for coastal vulnerability areas (clause 7(2) of the CM Act), land subject to coastal hazards should ideally be zoned considering the following desired outcomes:

- To mitigate current and future risk from coastal hazards in the present day and under climate change conditions;
- Maintain the natural features of foreshores such as beaches and dunes;
- Maintain public access to, and amenity of, beaches and foreshores;
- Encourage land use that reduces exposure to risks (e.g. via siting, design, etc.); and
- Prioritises the continued functionality of essential infrastructure during and immediately after a coastal hazard.

In coastal hazards areas the intensification of development should be avoided, consistent with the requirements of the CM Act, Resilience and Hazards SEPP and the Local Planning Direction 4.2.

Development on land subject to coastal hazards should be subject to appropriate development controls and the proponent demonstrate the risk can be appropriately managed. In some cases, mechanisms, such as time limited consents or adaptation plans, may be appropriate for inclusion in any Conditions of Consent for approved development.

The analysis also highlights the amount of recreational land and conservation or environmental management land that is subject to coastal hazards and highlights the need for a longer-term strategic approach to land use planning in the LGA.

2.2 Land within the Coastal Wetlands and Littoral Rainforest Areas

Table 2 summarises the land use zones that fall within the coastal wetlands and littoral rainforest coastal management areas. There are only 5.6 ha of littoral rainforest mapped for the study area, compared to nearly 7,000 ha of mapped coastal wetlands. Overall:

- The majority of littoral rainforest is mapped on recreational land adjacent to residential areas in Soldiers Point, as well as a small patch in Halifax Park; and
- The majority of coastal wetland areas are located on land subject to tidal inundation (present day HAT). Large coastal wetland areas are located around Tilligerry Creek, Saltwater Creek and Twelve Mile Creek, in Swan Bay and south and southwest of Karuah.

A large portion (59.4%) of coastal wetlands and littoral rainforest areas are conserved on land zoned C1 (37.2%), C2 (20.4%) or C3 (1.8%). This assists in giving effect to the management objectives for coastal wetlands and littoral rainforest under clause 6(2) of the CM Act, namely to protect and rehabilitate these areas, and to improve the resilience of these vegetation communities to climate change, including opportunities for migration.

Of the remainder, most of these areas are located on land zoned RU1, SP1 or SP2 (28.9% of the total), highlighting the importance of working with rural landowners to protect coastal wetlands and littoral rainforest.

It is noted that the mapping of the coastal wetlands and littoral rainforest areas was undertaken primarily by aerial photography analysis with limited ground-truthing and may not accurately represent the extent of these communities.

Table 2 Land within the Coastal Wetland and Littoral Rainforest Area

Land Use Zoning	Area (ha)				Excl. Proximity Areas	
	Coastal Wetland (CW)	CW Proximity Area	Littoral Rainforest (LR)	LR Proximity Area	Total Area (ha)	% of Total Area
E1 Local Centre (formerly B1 - Neighbourhood Centre)		0.18	-	-	-	0.0%
E1 Local Centre (formerly B2 - Local Centre)		0.50	-	-	-	0.0%
E2 Commercial Centre (formerly B3 - Commercial Core)	1.30	4.74	-	-	1.3	0.0%
MU1 Mixed Use (formerly B4 - Mixed Uses)		0.17	-	-	-	0.0%

Land Use Zoning	Area (ha)				Excl. Proximity Areas	
	Coastal Wetland (CW)	CW Proximity Area	Littoral Rainforest (LR)	LR Proximity Area	Total Area (ha)	% of Total Area
E3 Productivity Support (formerly B5 - Business Development)	0.09	14.95	-	-	0.09	0.0%
C1 - National Park and Nature Reserves	2,555.90	633.36	-	-	2,555.9	37.2%
C2 - Environmental Conservation	1,400.17	449.89	0.99	4.14	1,401.16	20.4%
C3 - Environmental Management	120.76	36.63	-	-	120.76	1.8%
C4 - Environmental Living	0.00	15.44	-	-	-	0.0%
E4 General Industrial (formerly IN1 - General Industrial)	0.95	16.74	-	-	0.95	0.0%
E4 General Industrial (formerly IN2 - Light Industrial)	0.00	2.27	-	-	-	0.0%
W4 Working Waterfront (formerly IN4 - Working Waterfront)	1.35	5.36	-	-	1.35	0.0%
R1 - General Residential	0.00	4.41	-	-	-	0.0%
R2 - Low Density Residential	3.38	101.57	0.02	13.37	3.4	0.0%
R3 - Medium Density Residential	0.00	10.26	-	-	-	0.0%
R5 - Large Lot Residential	0.30	28.60	-	-	0.3	0.0%
RE1 - Public Recreation	26.09	77.89	4.48	13.54	30.57	0.4%
RE2 - Private Open Space	2.14	22.39	-	-	2.14	0.0%
RU1 - Primary Production	121.30	146.19	-	-	121.3	1.8%
RU2 - Rural Landscape	721.55	885.12	-	-	721.55	10.5%
RU3 - Forestry	139.94	84.62	-	-	139.94	2.0%
SP1 - Special Activities	589.18	157.38	0.04	0.03	589.22	8.6%
SP2 - Infrastructure	673.13	298.45	-	-	673.13	9.8%
W1 - Natural Waterways	108.01	81.92	-	-	108.01	1.6%
W2 - Recreational Waterways	396.12	851.36	0.04	19.59	396.16	5.8%
TOTAL	**6,861.66**	**3,930.39**	**5.57**	**50.67**	**6,867.23**	**100%**

2.3 Land within the Coastal Environment Area

Table 3 summarises the land use zones for the mapped coastal environment area, which is largely land containing coastal features such as coastal waters and estuaries, and land adjoining those features, such as headlands and rock platforms. Additionally, the coastal environment area covers the nearshore seabed and extends over 5 km seaward from the shoreline.

The main land use zonings, summing to 79.8% of the total land-based coastal environment area, are C1 (17.8%), RU1 (9.8%), RU2 (13.9%) and W2 (38.3%). While most of the mapped land area is within conservation lands (C1), which is generally consistent with the objectives for coastal environment areas (clause 8(2) of the CM Act), a large proportion is on agricultural or rural land (RU1 or RU2).

Table 3 Zoned Land within the Coastal Environment Area

Land Use Zoning	Area (ha)	% of Total Area
E1 Local Centre (formerly B1 - Neighbourhood Centre)	6.45	0.0%
E1 Local Centre (formerly B2 - Local Centre)	24.76	0.1%
E2 Commercial Centre (formerly B3 - Commercial Core)	25.34	0.1%
E3 Productivity Support (formerly B5 - Business Development)	24.96	0.1%
C1 - National Park and Nature Reserves	5,872.77	17.8%
C2 - Environmental Conservation	1,812.71	5.5%
C3 - Environmental Management	766.29	2.3%
E4 General Industrial (formerly IN1 - General Industrial)	138.85	0.4%
E4 General Industrial (formerly IN2 - Light Industrial)	17.98	0.1%
W4 Working Waterfront (formerly IN4 - Working Waterfront)	30.38	0.1%
R1 - General Residential	4.51	0.0%
R2 - Low Density Residential	816.77	2.5%
R3 - Medium Density Residential	91.02	0.3%
R5 - Large Lot Residential	5.63	0.0%
RE1 - Public Recreation	342.38	1.0%
RE2 - Private Open Space	110.72	0.3%
RU1 - Primary Production	3,226.69	9.8%
RU2 - Rural Landscape	4,581.34	13.9%
RU3 - Forestry	383.33	1.2%
RU5 - Village	36.89	0.1%
SP1 - Special Activities	118.31	0.4%
SP2 - Infrastructure	1,498.44	4.5%
W1 - Natural Waterways	393.78	1.2%
W2 - Recreational Waterways	12,644.76	38.3%
TOTAL	**32,975.06**	**100%**

2.4 Land within the Coastal Use Area

Table 4 summarises the land use zones for coastal use area, which is land adjacent to coastal waters and estuaries where development is or may be carried out in future. The management objectives for these lands provide for protection and enhancement of the coastal use area, accommodating both urban and natural stretches of coastline (clause 9(1)) of the CM Act.

The majority of the coastal use area falls within land zoned C1 (31.6%), followed by land zoned RU1 (17.3%) and RU2 (21.7%), summing to a total of 70.6% of all coastal environmental area land within the study area. These land use zonings are generally consistent with the objects of the CM Act.

Table 4 Land within the Coastal Use Area

Land Use Zoning	Area (ha)	% of Total Area
E1 Local Centre (formerly B1 - Neighbourhood Centre)	6.32	0.1%
E1 Local Centre (formerly B2 - Local Centre)	16.61	0.2%
E2 Commercial Centre (formerly B3 - Commercial Core)	9.48	0.1%
E3 Productivity Support (formerly B5 - Business Development)	4.56	0.0%
C1 - National Park and Nature Reserves	3,141.92	31.6%
C2 - Environmental Conservation	753.60	7.6%
C3 - Environmental Management	145.87	1.5%
C4 - Environmental Living	0.53	0.0%
E4 General Industrial (formerly IN1 - General Industrial)	57.43	0.6%
E4 General Industrial (formerly IN2 - Light Industrial)	10.11	0.1%
W4 Working Waterfront (formerly IN4 - Working Waterfront)	24.30	0.2%
R1 - General Residential	0.01	0.0%
R2 - Low Density Residential	510.17	5.1%
R3 - Medium Density Residential	34.21	0.3%
R5 - Large Lot Residential	2.23	0.0%
RE1 - Public Recreation	278.78	2.8%
RE2 - Private Open Space	62.17	0.6%
RU1 - Primary Production	1,719.02	17.3%
RU2 - Rural Landscape	2,151.91	21.7%
RU3 - Forestry	192.68	1.9%
RU5 - Village	8.98	0.1%
SP1 - Special Activities	51.04	0.5%
SP2 - Infrastructure	576.97	5.8%
W1 - Natural Waterways	31.91	0.3%
W2 - Recreational Waterways	141.25	1.4%
TOTAL	**9,932.06**	**100.0%**

3 Land Use Planning and Development Controls for the Coastal Zone

Land use planning assists with:

- Addressing legacy development issues in the coastal zone; and
- Ensuring that future development is compatible with the various objectives of relevant planning instruments and directions.

In addition to the overarching legislative framework set by the EP&A Act and the CM Act, the core land use planning instruments relevant to the study area are:

- The Resilience and Hazards SEPP; and
- Port Stephens Local Environment Plan (LEP) 2013 (PSLEP 2013) and Development Control Plan (DCP) 2014 (PDCP 2014).

The PSLEP2013 is set within the regional planning context, set by the Hunter Regional Plan 2036.

Part 2.2 of the Resilience and Hazards SEPP provides development controls for coastal management areas consistent with the values, uses and/or risks associated with the subject land, as relevant. While the Resilience and Hazards SEPP overrides the provisions of a LEP, it does not contain any specific development controls for the coastal zone in a regulation or guidance document. Hence, the LEP and DCP are important to give detail to the intentions around development control. It is understood that there is no intention to create a development control plan or guideline to support the Resilience and Hazards SEPP provisions that relate to coastal management and so Council has a number of options in pursuing how land use planning and development control are manifest.

This section of the report provides a review of the existing LEP and DCP provisions and comments on how well they give effect to the objectives for coastal management areas detailed in the Resilience and Hazards SEPP.

Land use zoning within the parts of the study are that are subject to coastal hazards (as mapped by BMT WBM, 2021a) are reviewed in **Section 2** of this Appendix.

3.1 Regional Planning Context

The Hunter Regional Plan 2041 (DPE, 2022) sets the overarching direction for the region. It includes two objectives for which a series of performance outcomes and strategies are proposed that are of relevance to the CMP:

- Objective 6 – Conserve heritage, landscapes, environmentally sensitive areas, waterways and drinking water catchments; and
- Objective 7 – Reach net zero and increase resilience and sustainable infrastructure.

Those strategies under Objective 6 of particular relevance to the Port Stephens CMP are provided as an excerpt from (DPE, 2022) overpage.

Strategy 6.6

Local strategic planning will ensure all known places, precincts, landscapes and buildings of historic, scientific, cultural, social, archaeological, architectural and aesthetic significance to the region are identified and protected in planning instruments.

Strategy 6.7

Local strategic planning will consider Aboriginal cultural and community values in future planning and management decisions.

Strategy 6.10

Local strategic planning will support the sustainable growth of recreation and tourist facilities in inland and coastal lakes and encourage non-polluting passive enjoyment where possible whilst maintaining a natural shoreline.

Strategy 6.11

Planning proposals will demonstrate that development within a drinking water catchment or sensitive receiving water catchment will achieve a neutral or beneficial effect on water quality.

Those strategies under Objective 7 of particular relevance to the Port Stephens CMP are provided as an excerpt from (DPE, 2022) below.

Strategy 7.7

Local strategic planning will demonstrate alignment with the NSW Government's natural hazard management and risk mitigation policy framework including:

- *Planning for Bushfire Protection 2019*
- *NSW Coastal Management Framework*
- *Floodplain Development Manual and the Flood Prone Land Policy*
- *Planning for a more resilient NSW: A strategic guide to planning for natural hazards*
- any other natural hazards guidance that is released

Strategy 7.8

Local strategic planning will ensure future residential areas are not planned in areas where:

- residents are exposed to a high risk from bushfire, flood and/or coastal hazards, considerate of how these may impacted by climate change
- evacuation is likely to be difficult during a bushfire or flood due to its siting in the landscape, access limitations, hazard event history and/or size and scale
- any existing residential areas may be placed at increased risk
- increased development may cause evacuation issues for both existing or new occupants

Strategy 7.9

Local strategic planning will:

- map areas that are projected to be affected by sea level rise and other coastal hazards to limit the potential exposure of new development to these hazards
- be consistent with any relevant coastal management program adopted and certified for that area
- consider opportunities to adapt existing settlements at risk of exposure to sea level rise and coastal hazards in accordance with the NSW Coastal Management Framework, such as:
  - raising houses and roads
  - relocating or adapting infrastructure to mange coastal hazard risks, such as ingress of tidal water into stormwater systems and/or
  - undertaking beach nourishment
- consider opportunities to maintain natural coastal defences against sea level rise, such as:
  - maintaining or expanding coastal and riparian buffer zones
  - replanting and protecting coastal dune systems
  - fencing creeks and rivers to keep livestock out, limit erosion and protect water quality
  - controlling invasive species and/or
  - protecting and restoring mangroves and salt marsh areas to limit flooding, inundation and erosion.

3.2 Coastal Management Act 2016

The 'coastal zone' is defined under the CM Act as described in **Section 1** of this Appendix.

'Coastal hazards' are defined under the Act as:

(a) Beach erosion,
(b) Shoreline recession,
(c) Coastal lake or watercourse entrance instability,
(d) Coastal inundation,
(e) Coastal cliff or slope instability,
(f) Tidal inundation, and
(g) Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment flood waters.

Coastal cliff or slope instability was not considered for the study area by BMT WBM (2021a) and therefore has not been included for direct considerations given the lack of supporting information. In addition, coastal erosion was not investigated for the Inner or Outer Port, only the Open Coast portion of the study area.

Dune transgression, which was also mapped by BMT WBM (2021a), is not explicitly considered within the definition of coastal hazards under the CM Act and therefore technically cannot be incorporated into mapping of the coastal vulnerability under the Resilience and Hazards SEPP. It is recommended that legal advice be sought to clarify this matter. It is noted that dunal movement is identified to effectively be a coastal hazard in the State Environmental Planning Policy (Housing) 2021 (Housing SEPP) controls with respect to manufactured home estates (Schedule 6, Section 1).

'Coastal protection works' are defined in Section 27 of the CM Act as:

(a) Beach nourishment activities or works, and
(b) Activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.

Given dune transgression is not presently listed as a coastal hazard under the CM Act, any measures to manage dune transgression hazard would not be expected to be categorised as coastal protection works under the Act. It is recommended that legal advice be sought to clarify this matter.

Clause 27 requires that development consent for coastal protection works must not be granted unless the consent authority is satisfied that the works will not, over the life of the works:

- Unreasonably limit public access to or use of a beach or headland;
- Pose a threat to public safety; and that
- Satisfactory arrangements have been made by conditions imposed on a consent for the maintenance of the works and to restore the beach (or adjacent land) if any increased erosion occurs as a result of the works.

The transitional arrangements in Part 2 of Schedule 3 of the CM Act includes a clause relating to temporary coastal protection works. Any such works undertaken under the former *Coastal Protection Act 1979* continue to have effect if the works were placed on private land before the repeal date and if the owner of the land undertook the necessary notifications of Council and others in compliance with section 55X of the former Act.

Clause 10(1) provides that LEPs may amend the Resilience and Hazards SEPP to identify (or amend) coastal management areas.

3.3 Resilience and Hazards SEPP

The provisions of the Resilience and Hazards SEPP relating to development within the coastal vulnerability area (which has not been incorporated into the SEPP as yet for the Port Stephens LGA) are detailed in clause 2.9 and require the consent authority 'to be satisfied' that the proposed works:

- Are designed to withstand coastal hazards over their design life;
- Will not alter coastal processes or reduce public amenity, access to or use of the coastal zone; and
- Incorporates measures to manage the risk to life and public safety from coastal hazards.

Development is required to incorporate 'appropriate responses to, and management of, anticipated coastal processes and current and future coastal hazards'.

Note that while Clause 2.9 is not currently operable by way of the absence of a coastal vulnerability map, Clause 2.12 of the Resilience and Hazards SEPP does require the consent authority to be satisfied that any development in the coastal zone is not likely to increased risk of coastal hazards on that land or other land. This clause offers an interim solution for development in the coastal vulnerability area (which is predominantly contained within the coastal environment area or the coastal use area) and is currently operable (as described in Planning Circular PS21-09 (revised 10 August 2023)[3].

The Resilience and Hazards SEPP provisions are not specific with respect to minimum standards or controls on development and would need to rely on more specific requirements, such as in relation to performance objectives, built form, set-backs, compatible materials and other features of buildings or concessional development. Further, as outlined above, dune transgression is not identified as a 'coastal hazard' under the CM Act and is therefore not explicitly subject to the provisions of the Resilience and Hazards SEPP relating to coastal vulnerability areas. It is recommended that legal advice be sought to clarify this matter.

3.4 Exempt and Complying Development Codes SEPP

Clause 1.19(e) of the *State Environment Planning Policy (Exempt and Complying Development Codes) 2008* (Codes SEPP) states that complying development is not permitted on land located within:

(i) a buffer area, or

(ii) a river front area, or

(iii) an ecologically sensitive area, or

(iv) environmentally sensitive land, or

(v) within a protected area.

'Environmentally sensitive areas' includes coastal waters, coastal lakes, and coastal wetlands and littoral rainforest and their associated proximity areas.

[3] https://www.planning.nsw.gov.au/sites/default/files/2023-03/planning-circular-ps-21-009-planning-for-coastal-hazards.pdf

Clause 1.19(f) states that complying development may not be carried out on land that is identified by an Environmental Planning Instrument (EPI), a DCP or a policy adopted by the council as being or affected by—

(i) a coastline hazard, or

(ii) a coastal hazard, or

(iii) a coastal erosion hazard.

3.5 Housing SEPP

The Housing SEPP enables the development of diverse housing types, in particular for more vulnerable members of the community.

Under clause 80(1)(b), Part 5 Housing for seniors and people with a disability does not apply to land described in Schedule 3, which includes coastal wetlands and littoral rainforest areas and coastal vulnerability areas, as identified under the Resilience and Hazards SEPP.

Clause 122 permits development for the purposes of a manufactured home estate, except on land within one or more categories described in Schedule 6, which includes:

- Land which the council, after taking into account the principles set out in the Coastline Management Manual published by the New South Wales Government in September 1990 [now superseded by the Coastal Management Manual (2018)], considers is unsuitable for residential development because of coastal erosion, tidal inundation, slip, dunal movement or any other risk of a similar nature.
- Land which is identified in an EPI, or in any planning strategy of the Department or the council approved for the time being by the Director, by words which are cognate with or a description consistent with any one or more of the following….extractive resources…littoral rainforest…wetlands.
- Land that is within the following coastal local government areas, being land that is not zoned or reserved under an EPI for urban use and is not identified as suitable for urban development under the Coastal Urban Planning Strategies or Residential Strategies approved for the time being by the Director [includes Port Stephens LGA].

The Housing SEPP does not include any provisions restricting development on land subject to coastal hazards for any other types of housing permitted under the SEPP. In addition, it contains no provision for emergency management or appropriate engineering standards to manage the risk from coastal hazards for housing development. This means that, as the Housing SEPP overrides all other EPIs, there is no mechanism to refuse housing that is permitted with consent or complying development under the Housing SEPP, other than for development under Parts 5 or 8 of the SEPP. Further, any provisions of the Port Stephens LEP or DCP, or under the Resilience and Hazards SEPP, that relate to management of risk from coastal hazards would most likely not be enforceable.

It is recommended that further exploration of the issues arising from the outcome of this review be conducted and legal advice obtained to ensure that coastal hazards are appropriately managed.

3.6 Planning Proposals and Local Planning Direction 4.2 Coastal Management

A planning proposal is a document that explains the intended effect of a proposed LEP or proposed amendments to an LEP and is required under Division 3.4 of the EP&A Act (DPE, 2023b). It explains the

intended outcomes, identifies and assesses the potential impacts that the changes to the LEP may have and provides justification for making the LEP. It describes how the amendments to an LEP will give effect to strategic and site-specific planning outcomes, providing a link between strategic plans and amending an LEP.

Local Planning Direction 4.2 applies when an authority prepares a planning proposal that applies to land that is within the coastal zone. Direction 4.2 requires that a planning proposal include provisions that give effect to and are consistent with:

- The objects of the CM Act and the objectives of the relevant coastal management areas;
- The NSW Coastal Management Manual and associated Toolkit;
- The NSW Coastal Design Guidelines 2003 (soon to be replaced by the draft Coastal Design Guidelines 2022); and
- Any relevant, certified CMP or CZMP that applies to the land.

In addition to the strategic merit test must be applied to planning proposals, a planning proposal is also required to have site-specific merit, having regard to a series of mandatory requirements and recommendations included in Section 3.2 of the draft 2022 Coastal Design Guidelines. There are a range of outcomes identified in Section 3.2 that range from the protection and improvement of public access and natural assets of the coastal zone, to accounting for natural hazards risks. This includes current and future coastal hazards, interactions between coastal and other hazards, and not allowing intensification of development in the coastal vulnerability area (or on land identified as affected by a current or future hazard). It is noted that these Guidelines have now been updated with a draft issued in 2022, and reference should be made to this updated document, which is likely to be finalised shortly[4].

The endorsement of the Port Stephens CMP by Council and the preparation of a planning proposal to amend the PSLEP 2013 would be consistent with the Direction.

3.7 Environmental Planning and Assessment Act 1979

3.7.1 Section 10.7 Certificates

Planning Circular PS 21-033 (revised 10 August 2023)[5] provides guidance to local Councils on the disclosure of coastal hazards on planning certificates issued under Section 10.7 of the EP&A Act. A planning certificate under Section 10.7(2) discloses matters relating to the land, including whether or not the land is affected by a policy that restricts development of the land (e.g. development controls in a DCP). A planning certificate may also include information under Section 10.7(5) about other relevant matters affecting the land that Council is aware of but is not disclosed in a Section 10.7(2) certificate. A Section 10.7(5) may include past, current or future coastal hazard issues. It provides the mechanism by which a Council can give effect to their obligation to disclose information about a hazard from the time it becomes aware of the existence and extent of that hazard (i.e. upon completion of an investigation or study) and prior to adoption of a policy or planning instrument to manage that hazard.

Planning circular PS 21-033 provides guidance on the disclosure of coastal hazards on planning certificates.

[4] https://www.planningportal.nsw.gov.au/draftplans/under-consideration/draft-coastal-design-guidelines
[5] https://www.planning.nsw.gov.au/sites/default/files/2023-03/planning-circular-ps-21-033-planning-certificates-coastal-hazards.pdf

Council's planning certificates (known as a Section 10.7 certificate) identify if the land, or part thereof, is exposed or has potential future exposure to coastal hazards. Given the absence of a coastal clause in the LEP, Council has not previously had a Section 10.7 notification in relation to coastal hazards.

In mid-2023 Council updated the 10.7(5) planning certificates to discharge their duty of care with respect to identification of properties at risk from coastal hazards in the CMP Stage 2 (BMT, 2021a). In the event Council adopts the CMP and associated planning proposal, Council would be required to update the information it provides on Section 10.7(2) planning certificates.

3.7.2 Existing Uses Provisions

Division 4.11 of the EP&A Act relates to 'existing uses', which is defined as the use of a building, work or land for a lawful purpose immediately before the coming into force of an EPI which would have been prohibited. Clauses 4.65 to 4.70 permit the continuance of the existing use of the land, but without any alteration, extension, expansion or intensification of the existing use. Hence, if a site was previously zoned R1 – General Residential and had been developed for multi-dwelling housing, this existing use is preserved, even if the site has subsequently been re-zoned. This has potential to result in challenges managing the present and future risk from coastal hazards, even if a zoning change to overcome this issue occurs.

3.7.3 Unlawful Structures

Unlawful structures, which can include coastal protection works, may occur in the coastal zone. Under Section 9.15 of the EP&A Act, consent authorities (such as Council) have broad powers to investigate unauthorised works and determine whether development is/was carried out in accordance with the conditions of a development consent (where required). Where an unlawful structure is identified, Council has a range of enforcement powers available, including issuing orders, issues fines and official cautions, commencing prosecution proceedings in court and negotiating practical solutions.

Under Part 1 of Schedule 5 of the EP&A Act Council can issue an order to demolish any such works, or alternatively the structure can be regularised via a retrospective development application.

In addition, where material has been dumped in the coastal zone (e.g. for shoreline stabilisation purposes), the activity may be considered an offence under the *Protection of the Environment Operations Act 1997* and may be subject to penalties.

3.8 Port Stephens LEP 2013

The PSLEP 2013 does not contain any specific provisions relating to the control of coastal hazards. It is noted that there are also no provisions in the Standard Instrument – Principal LEP 2006 that can be used to manage risk from coastal hazards as reliance is instead on the Resilience and Hazards SEPP in this regard.

Clause 5.7 requires development consent in order to carry out development on any land below the Mean High Water Mark (MHWM) and is a mandatory clause from the Standard Instrument LEP.

Clause 5.22 Special flood considerations (once operative) has the effect of managing high risk development such as waste management facilities that may have potential to present an environmental or public safety hazard if inundated. While the clause relates to catchment flooding, a similar clause for coastal hazards may be beneficial.

There is currently no foreshore building line clause in the PSLEP 2013.

Part 7 Additional local provisions does not contain any provisions relevant to development in the coastal zone or management of risk from coastal hazards.

In the absence of a coastal vulnerability map, a new coastal hazards clause and accompanying coastal risk planning map should be included in the local provisions of the PSLEP 2013 to resolve the present lack of specificity with respect to coastal hazards that is not explicitly addressed through the application of the coastal use or coastal environment clause in the Resilience and Hazards 2021 SEPP. Examples of local provisions for coastal risk are provided in:

- Clause 7.5 of the Tweed LEP 2014;
- Clause 6.5 of the Warringah LEP 2011;
- Clause 7.5 of the Pittwater LEP 2014;
- Clause 7.4 of the Great Lakes LEP 2014; and
- Clause 7.4 of the Lake Macquarie LEP 2014.

However, there are no 'model provisions' for coastal risk management available.

Clause 5.9 of the PSLEP 2013 enables the repair or replacement of lawfully erected dwelling houses and secondary dwellings that have been damaged or destroyed by a natural disaster and would therefore apply to any such dwellings that have been lost to, or rendered uninhabitable by, coastal erosion (or another coastal hazard). This clause is discussed further in **Section 4.1** of this Appendix.

3.9 Port Stephens DCP 2014

At the time of preparation of this report, there were no controls related to coastal hazards within the PSDCP 2014, nor any policies or codes for development of land affected by coastal hazards.

For example, there is no inundation planning level for coastal or tidal inundation, as distinct from inundation due to catchment flooding (and noting these events do not necessarily occur at the same time). Section B5 of the DCP provides development controls for flood prone land, being land located in the Flood Planning Area (FPA). Flood prone land is defined as all land falling within the Probable Maximum Flood (PMF) extent. The controls Section B5 of the DCP would be a useful basis for starting development of local provisions relating to coastal hazards. However, they are not directly translatable for several reasons, including (but not limited to):

- There are some specific aspects of coastal inundation that require different development controls (e.g. for saltwater inundation and wave run-up);
- Tidal inundation would be progressive and result in permanent inundation, rather than an event-based inundation hazard and will in some respects require a different approach;
- Having separate controls for coastal hazards would remove potential for confusion as to what controls apply to inundation from catchment flooding versus tidal or coastal inundation; and
- Coastal erosion and dune transgression are not currently covered under the PSDCP 2014.

The PSDCP 2014 requires an update to overcome the present lack of controls specific to management of coastal hazards.

4 Build Back Better

The concept 'Build Back Better' from natural hazards relates to improving the resilience of development that is to be repaired or re-constructed following a natural hazard event. The NSW Government defines Build Back Better as: 'the use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalisation of livelihoods, economies, and the environment.'

A natural hazard is defined in the strategic guide for natural hazards (DPE, 2021) as 'A natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.' This may include development impacted by coastal hazards and should consider the service life of the structure, building or infrastructure and the current and future risk from coastal hazards.

One of the objectives of the EP&A Act (1.3(h)) is to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants. Build Back Better is consistent with that objective.

4.1 Provisions Under the Standard Instrument LEP

The Natural Disasters Clause (Clause 5.9 in the Standard Instrument LEP) is highly relevant to Build Back Better. The Natural Disasters Clause aims to 'support better and quicker rebuilds of dwellings following natural disasters'. Clause 5.9 of the LEP Standard Instrument, which was introduced following the devastating 2019/2020 bushfires, permits the repair or replacement of lawfully erected dwellings that have been damaged or destroyed by a natural disaster. As previously discussed, this clause has been adopted in the PSLEP 2013, and while Council will still be required to complete a merit assessment of the development, the re-build or repair cannot be refused based on any development standards in the LEP. The term 'natural disaster' is not defined in the Standard Instrument but it would be reasonable to assume that a coastal erosion or inundation event could be classified as a natural disaster.

There is currently no provision within the clause for imposing controls, such as setbacks or engineering standards, to improve the resilience of the dwelling and reduce the risk from coastal hazards, or to ensure the ongoing provision of public access to the coast (where it was previously provided through or seaward of the subject lot). There is no specific provision for managed retreat (voluntary or otherwise).

However, the FAQ that accompanies the Natural Disasters Clause[6] states 'The replacement or repair of a dwelling does not have to be identical to the original dwelling which was destroyed or damaged. Changes to the design and location of a proposed dwelling may be required to meet the relevant provisions of development control plans or other relevant planning instruments and associated legislation.' This provides an avenue for application of development controls to provide improved resilience through the reconstruction of the subject land.

As such, the requirements of the CM Act and any relevant LEP or DCP provisions still apply to a development where the clause operates, so providing these standards and planning controls are regularly updated to reflect best practice when re-building for resilience, then building back better (i.e.

[6] https://www.planning.nsw.gov.au/sites/default/files/2023-03/natural-disaster-recovery-faq.pdf

to contemporary risk-based building design standards, which would most likely be better than those that the building that was damaged or destroyed) would be anticipated to occur by default.

4.2 Options for Build Back Better

Development in areas that have been affected by a coastal erosion and/or coastal inundation event should meet the following minimum performance standards (note that properties in the zone of wave impact are highly unlikely to be able to be built back better given the very high risk nature of these dwellings, the expected loss of actual land to build upon due to erosion, and special controls are required for these circumstances) and the recommendations below:

- Where possible – retain or re-site the development on that part of the lot that has the least coastal hazard (e.g. landward of the zone of wave impact and ideally landward of the zone of reduced foundation capacity, Neilsen *et al*., 1992). Where it is not possible to re-site the development (e.g. the whole lot is affected), seek to ensure the other performance standards are met and where permissible, incorporate coastal protection works consistent with the requirements of the Resilience and Hazards SEPP, the provisions of the CM Act and any requirements of the relevant CMP.
- All new or re-constructed elements should be able to withstand the impact of coastal inundation and wave forces up to the 100 year ARI event over the life of the development.
- For residential development, all habitable floor levels to be at a minimum of either:
    - the coastal inundation level for the 100 year ARI event, plus an allowance for climate change, or
    - the same level as the existing floor level where that level is more than 0.5 m above the adjacent ground level or at the coastal inundation level, or
    - at least 0.5 m above the adjacent ground level where setting the floor at the coastal inundation level for the 100 year average recurrence interval event is incompatible with any existing dwelling components.
- For all other types of development, all floor levels to be at a minimum of either:
    - the coastal inundation level for the 100 year ARI event, or
    - the same level as the existing floor level where that level is more than 0.5 m above the adjacent ground level or at the coastal inundation level for the 100 year ARI event, or
    - at ground level with the inclusion of either:
        - a mezzanine storage area at least 1.5 m above the ground level, or
        - some form of temporary inundation barrier across ingress points (e.g. doors/windows) to prevent ingress of ocean/estuary waters.
- All new/replaced elements of the building below the coastal inundation level should be inundation compatible materials and include the relevant corrosion protection and fixing requirements for coastal areas, being up to 1km from breaking surf (e.g. marine grade type materials/fittings, for example those listed in Volume 2 of the Building Code of Australia (ABCB, 2022)).

However, in some locations the residual level of risk from coastal hazards, even following application of the measures listed above may be deemed intolerable. In circumstances where the risk from coastal hazards cannot be effectively managed voluntary acquisition may play a role.

Examples of development controls incorporated within a DCP are provided for two nearby Councils below.

Central Coast Council

The first example is for Central Coast Council. In March 2016 Central Coast Council adopted a revised Chapter 6.2 Coastal Frontage in the Gosford DCP 2013, which incorporated flexibility so that development potential on coastal fronting properties is maintained, while also planning responsibly for future coastal risk, including sea level rise (the intent). Following the July 2020 coastal erosion event at Wamberal Beach property owners have sought independent geotechnical advice and used the exemption provisions in the DCP to build back seaward of the Coastal Building Line (CBL) in a coastal hazard area. These provisions have been retained and carried over into Section 3.2.3.4 of the new Central Coast DCP 2022.

Here Council is attempting to balance BBB to reduce risk to life and property, while maintaining the value and development potential of property for an individual. In this case the build risk is essentially transferred from Council to independent geotechnical consultants (although this would require legal advice to confirm). Potentially development at these locations may not be suitable due to coastal hazards, but it is a challenging situation to manage (for example, removing dwelling entitlements through partial or complete zone changes and/or voluntary acquisition).

MidCoast Council

In contrast to Central Coast, MidCoast Council has voluntary retreat controls in place with the intention of precluding rebuilding in the worst-affected coastal hazard areas following a natural disaster. The Greater Taree DCP 2010, under Part D1.3 Old Bar to Manning Point, has controls that include a Section 88E Instrument on the title for properties in the coastal hazard area between the Coastal Hazard Line and the Immediate Hazard Line, specifying voluntary retreat (this process is activated as a result of a consent issued for development). This part of the DCP notes 'By developing in this area, landowners accept that they may ultimately have to demolish or remove the structure if the coastline continues to recede... Any consent for development in this area will have a condition imposed pursuant to section 88E of the *Conveyancing Act 1919* imposing a public positive covenant that serves as a mechanism to link the approved Risk Management Plan outcomes to the land in perpetuity and additionally make future purchasers aware of the coastal risks to development constructed on this land.'

In terms of the real application of this clause, following the June 2016 east coast low coastal erosion event several properties were damaged at Old Bar and some properties were lost on Old Bar beach. The properties that were lost have not since been rebuilt, presumably as an outcome of the voluntarily retreat controls imposed through the consent process.

4.3 Construction Codes and Engineering Standards

The Building Code of Australia (a component of the National Construction Code), while it is regularly updated in response to natural disaster events, does not currently directly address coastal hazards.

The 2022 version of the National Construction Code presently aims to protect life, but not property, which may mean that, in some cases, proportionate and cost-effective options to improve the resilience of a dwelling are not prescribed because they do not also function to protect life.

Note that the National Construction Code and a range of Australian standards that are used for the design of buildings and structures does not mandate design for climate change (including sea level rise). Instead, the land use planning system and associated development controls in NSW are intended to control and manage the location of buildings with respect to climate change, to address future hazards.

In 2016 Engineers Australia published their *Climate Change Adaptation Guidelines in Coastal Management and Planning*, which provide guidance to local government engineers and managers making appropriate decisions in managing coastal development problems subject to climate variability and climate change, including when to call for additional expert advice.

Section B5 of the PDCP 2014 includes reference to the following building codes:

- *Construction of Buildings in Flood Hazard Areas* (ABCB, 2012) – this guideline has now been rolled into the 2022 National Construction Code; and
- *Guidance on Building in Flood Prone Areas* (HNFMSC, 2006).

While both these guidelines provide useful advice on building on land subject to inundation, they were developed to build resilience to catchment flooding specifically and do not contain guidance specifically relevant to coastal or tidal inundation, or for coastal erosion or dune transgression.

4.4 Strategic Planning for Natural Hazards and NSW

NSW DPHI has prepared Strategic Planning for Natural Hazards in NSW package, which includes:

- *A Strategic Guide to Planning for Natural Hazards in NSW* (DPE, 2021), which highlights the importance of considering natural hazards to reduce the impact they have on communities, and
- A toolkit of resources to support strategic planning process and help plan-making authorities find the information and data they need.

In relation to BBB, Section 7 (Plan to build and rebuild for the future with a changing climate) of the Strategic Guide states 'Whether councils should mitigate these risks will depend on the exposure of the community, the scale of impacts and their frequency of occurrence. Significant investment in this work may not be warranted in some communities. Relevant risk management processes for specific natural hazards may identify appropriate, practical and feasible mitigation actions that can address risk at the location and allow building and rebuilding to occur to more contemporary building standards. However, where natural hazard risk assessment identifies areas where structures may be destroyed in a disaster event and should not be rebuilt as the risks cannot be effectively managed, it may be appropriate to reflect this in strategic land-use plans by identifying areas where strategic retreat options should be considered.'

Appendix C

Revised Risk Assessment

Table 1 Likelihood Criteria Adopted for the Stage 1 Scoping Study (after: PSC, 2020)

Descriptors	L1 – Rare	L2 - Unlikely	L3 - Possible	L4 – Likely	L5 – Almost Certain
Intuitive (program / project)	Unlikely to happen	Likely to occur in less than 1 in 10 projects of this kind	Likely to occur in between 1 and 4 projects of this kind	Likely to occur in between 1 in 2 projects of this kind	Likely to occur in more than 1 or 2 projects of this kind
Frequency	1 in 20 year event or loss	1 in 8 year event	1 in 4 year event	1 in 2 year event	Annual
Probability	<5%	5-20%	20-50%	50-90%	>90%
Description	Would be very surprised if the risk occurred. Only ever occurs under exceptional circumstances; no evidence of previous incidents.	Risk is not expected to occur, would be quite surprised if it did. Conceivable but not likely to occur under normal operations.	Risk is not expected to occur, but would also not be surprised if it did. Not generally expected to occur but may under specific circumstances.	Risk is expected to occur. Would be quite surprised if it didn't. Will probably occur at some stage based on evidence of previous incidents.	Clear indication that the risk will materialise. Would be very surprised if it didn't. Event expected to occur most times during normal operation.

Table 2 Consequence Criteria Adopted for the Stage 1 Scoping Study (after: PSC, 2020)

Criteria	C1 – Insignificant	C2 – Minor	C3 – Moderate	C4 – Major	C5 - Extreme
Project consequences	Time: Insignificant impact on project milestones. Quality: Some non-key requirements are not met. Cost: Justifiable additional costs that can be absorbed in the projects budget.	Time: Minimal impact on project milestones. Quality: A key requirement may not be met. Cost: Additional costs requiring reprioritisation and/or reallocation of project funds.	Time: Moderate to high impact on project milestones. Quality: Some key requirements may not be met. Cost: Additional costs requirement submission for supplementary funding.	Time: Major impact on project milestones. Quality: A majority of key requirements may not be met. Cost: Significant additional costs delaying project.	Time: Project failure Quality: Major deficiencies with all project deliverables. No requirements met. Cost: Budget expanded without achieving any key deliverables.

Criteria	C1 – Insignificant	C2 – Minor	C3 – Moderate	C4 – Major	C5 - Extreme
Governance / compliance	No regulatory consequence, no litigation, prosecution or penalty.	Minor regulatory consequence with formal warning / instruction with unlikely litigation, prosecution or penalty.	Moderate regulatory consequence which may result in fines. Contractual non-compliance or breach of legislation with threat of litigation, prosecution and/or penalty.	Major regulatory consequence resulting in material fines or restrictions on Council operations. Probably litigation or prosecution and/or penalty.	Extreme regulatory consequence which could result in dismissal of Council. Non-compliance or breach of legislation with litigation, prosecution and/or penalty with fines.
Public image & reputation	No impact on reputation/staff morale & no public/media interest.	Minimal customer/ morale sensitivity or minimal damage to Council name.	Moderate customer/ morale sensitivity and damage to Council name with minor local interest.	Major customer/ morale sensitivity; damage to Council name attracting national media & social interest and some impact on business activities.	Significant customer/ morale sensitivity and damage to Council name; significant international media & social media attention and impacting noticeably on business activities.
Safety & people	Local first aid may be required.	Minor injury that may require medical attention with no ongoing treatment.	Injury requiring ongoing medical treatment and/or lost time.	Extensive injuries that are life threatening; or multiple serious injuries and hospitalisation.	Any fatality or multiple permanent disability or ill health.
Environment	Negligible impact with no remediation required. Little or no impact on terrestrial and or aquatic ecosystems.	Minor impact, reversible with short-term remediation required. Minor changes in native species abundance and community structure consistent in magnitude with seasonal changes/ natural variation. Recovery likely in a year.	Moderate impact, reversible with medium term remediation required. Impact to a regionally important species isolated to a localised area. Recovery may take several years.	Significant impact contained to site/project, irreversible or long term remediation required. Major impact to entire regionally important habitat or species recovery may take many (>10) years.	Significant ongoing impact, irreversible and not contained to site/project life. Significant ongoing, irreversible impact with recovery unlikely. Entire habitat destruction or local extinction of a nationally important species.
Financial	1% of budget for service unit/s or >$100K for the organisation as a whole.	2.5% of budget for service unit/s or >$1M for the organisation as a whole.	5% of budget for service unit/s or >$5M for the organisation as a whole.	10% of budget for service unit/s or >$10M for the organisation as a whole.	25% of budget for service unit/s or >$20M for the organisation as a whole.

Criteria	C1 – Insignificant	C2 – Minor	C3 – Moderate	C4 – Major	C5 - Extreme
Social impact	Possible short term impacts to a small number of people within the project area. Little to no impact of a communities access to services, wellbeing and safety.	Short term or indirect impacts that will affect the well-being of people within the project area. Reversible small to medium impact in the short term (1 year) to communities and their access to services, opportunities, culture, wellbeing and safety. Many suitable and comparable alternative sites exist. <10% of community affected.	Medium to long term, including indirect impacts to people both within the project area and beyond. Reversible moderate medium-term (> 5 years) and/or major short-term impact to communities and their access to services, opportunities, culture, wellbeing and safety. Consequences present beyond the immediate area of impact but restricted to the local area. 10-25% community affected.	Long term or irreversible impacts (including cumulative) that affects many people either within or beyond the project area. Major long-term (>10 years) and /or devastating short-term impacts to communities and their access to services, opportunities, culture, wellbeing and safety. Consequences present at a LGA level. Few alternative sites exist. 25-50% of community affected.	Long term or irreversible impacts (including cumulative) that affects many people either within or beyond the project area or continues beyond the life of the project. Widespread irreversible impact to communities and their access to services, opportunities, culture, wellbeing and safety. Consequences present across a regional scale. No alternative sites exist. More than 50% of the community affected.
Economic impact	Negligible economic impacts to the project area, reversible in the short-term. Damage to property, infrastructure, or local economy <$50,000.	Minor economic impacts to the project area, reversible in the short-term. Damage to property, infrastructure, or local economy $50,000-$500,000.	Moderate economic impacts to the project area, reversible in the short-term. Damage to property, infrastructure, or local economy $500,000 to $5 million.	Significant economic impacts to the project area, irreversible or reversible in the long term. Damage to property, infrastructure, or local economy $5-20 million.	Significant ongoing economic impact, irreversible and not contained to the project area. Damage to property, infrastructure, or local economy >$20 million.
Operations / service delivery (business continuity)	Insignificant disruption to service activities. Negligible impact on service provision. Short term inconvenience.	Minor to moderate disruption to service activities. Minor to moderate % of customers inconvenienced and may receive some complaints.	Moderation disruption to services (1-5 days). Medium to large % of customers inconvenienced and will receive complaints.	Continuing difficulties in servicing customers over prolonged period (5-10 days) across majority of service locations that will result in a large amount of complaints.	Severe long term disruption or permanent loss of capability to provide critical services to customers for 10+ days.

Table 3 Risk Ratings Adopted for the Stage 1 Scoping Study (after: PSC, 2020)

Risk Rating	L1 – Rare	L2 - Unlikely	L3 - Possible	L4 – Likely	L5 – Almost Certain
C1 – Insignificant	Low	Low	Low	Medium	Medium
C2 – Minor	Low	Low	Medium	Medium	High
C3 – Moderate	Medium	Medium	High	High	High
C4 – Major	Medium	Medium	High	High	Extreme
C5 - Extreme	High	High	High	Extreme	Extreme

Table 4 Updated Risk Assessment

Threat (& Stressor)	Aspect	Descriptor	Stage 1 Present Day Risk (source: PSC, 2020)*			Stage 1 Future Risk (source: PSC, 2020)*	Updated Stage 3 Risk Assessment				
			Open Coast	Outer Port	Inner Port		Present Day Risk by Aspect	Consolidated Present Day Risk	2040	2070	2120
CH Threat 1 – Beach erosion (Physical disturbance, water pollution, asset/infrastructure loss)	Environmental	Damage to/loss of species and communities, disturbance on benthic infauna. Assisted recovery may be required for dune habitat.	High	Low	Low	Very High	Medium	Medium	High	High	High
	Socio-economic	Loss of beach width/volume impacts recreation and amenity. Potential for assets to be located in Zone of Reduced Foundation Capacity. Periodic beach scraping and asset replacement required. Closure of sections of Stockton dunes.	Medium	High	Low	Very High	Medium				
	Heritage	Direct impact to heritage sites. Impact to Aboriginal cultural values / traditional resource use / cultural activities.	Very High	Very High	High	Very High	Medium				
CH Threat 2 – Shoreline recession (Physical disturbance, water pollution, asset/infrastructure loss)	Environmental	Permanent damage to/loss of species and communities if retreat not possible.	High	Low	Low	Very High	Medium	Medium	High	High	Extreme
	Socio-economic	Permanent loss of beach or foreshore open space if retreat not possible. Loss of associated assets. Impact to associated economic activities. Damage to/loss of private infrastructure.	Medium	High	Low	Very High	Medium				
	Heritage	Loss of heritage sites if relocation or salvage not possible/appropriate. Impact to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	High	High	Very High	Medium				
CH Threat 3 – Inundation with wind-blown sand (Physical disturbance)	Environmental	Inundation of Coastal Sand Apply – Blackbutt forest at Stockton.	Medium	Low	Low	High	Low	Medium	Medium	High	High
	Socio-economic	Sand accretion around private and public assets, in particular SLSCs, car parks etc., requiring management by Council.	High	Low	Low	High	Medium				
	Heritage	Indirect impacts to heritage sites (e.g. exposure, smothering). Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Very High	Low	Low	Very High	Medium				
CH Threat 4 – Coastal inundation (Flooding, water pollution)	Environmental	Short-term inundation of communities and displacement of some species. Dependent on the species specific tolerance, sub-lethal or lethal effects may occur.	Low	Medium	Medium	Extreme	Medium	High	High	High	Extreme
	Socio-economic	Public safety risk during event. Loss of public access, in particular to some roads that are important for emergency access. Damage to public and private assets. Impacts to stormwater and sewer systems.	Medium	High	High	Extreme	High				
	Heritage	Impacts to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	Medium	Medium	Extreme	High				
CH Threat 5 – Tidal inundation (Flooding, water pollution)	Environmental	Shift in the intertidal zone with implications for seagrass, intertidal vegetation/wetlands and low-lying terrestrial vegetation. Impacts to associated species. Migration may not be possible.	NA	NA	NA	NA	Low	Low	High	Extreme	Extreme
	Socio-economic	Permanent inundation of public and private land, loss of access due to inundation of roads, loss of functionality of critical assets like sewer and stormwater, salinisation of groundwater.	NA	NA	NA	NA	Low				
	Heritage	Permanent inundation of some heritage sites. Loss of access to some cultural sites and/or ability to undertake cultural activities. Loss of cultural values.	NA	NA	NA	NA	Low				
CH Threat 6 – Cliff / slope instability (Cliff / slope instability)	Environmental	Only isolated potential for impact to ecological communities.	Low	Low	NA	Unknown	Low	Medium	Medium	Medium	Medium
	Socio-economic	Very limited infrastructure on rocky headlands. Public safety risk.	Medium	Low	NA	Unknown	Medium				

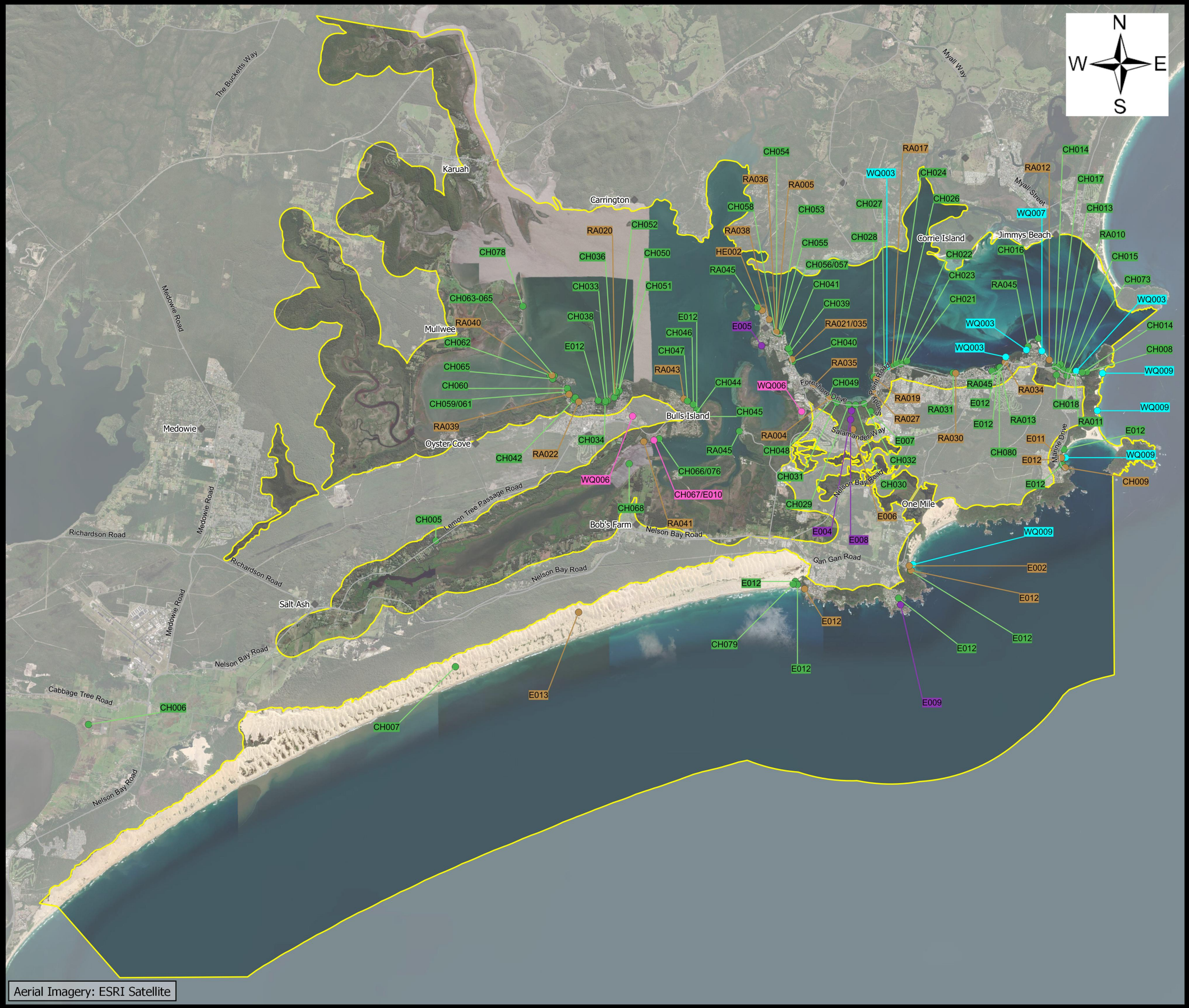
Threat (& Stressor)	Aspect	Descriptor	Stage 1 Present Day Risk (source: PSC, 2020)*			Stage 1 Future Risk (source: PSC, 2020)*	Updated Stage 3 Risk Assessment				
			Open Coast	Outer Port	Inner Port		Present Day Risk by Aspect	Consolidated Present Day Risk	2040	2070	2120
	Heritage	Direct impacts to non-Aboriginal and Aboriginal heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	Low	NA	Unknown	Medium				
CH Threat 7 – Accretion of marine sand (physical disturbance)	Environmental	Smothering of marine habitats such as seagrass and soft coral (e.g. Halifax), may result in permanent loss of habitat. Impacts to associated marine fauna.	Low	High	Medium	Unknown	High	High	High	High	High
	Socio-economic	Impacts on navigation and access and stormwater drainage.	Low	High	Medium	Unknown	High				
	Heritage	Potential for impacts to heritage sites, Aboriginal cultural values / traditional resource use / cultural activities.	Medium	Low	Low	Unknown	Medium				
WQ Threat 1 – Urban stormwater pollution (Freshwater inflows, sediment, chemical, nutrients)	Environmental	Smothering. Fouling of seagrass and reduced light penetration. Increased algal productivity (e.g. blooms). Impact to aquatic ecosystem health.	Low	High	High	Very High	Medium	Medium	High	High	High
	Socio-economic	Closure of beaches. Closure - no direct harvesting for oyster growers.	Low	High	High	Very High	Medium				
	Heritage	May impact heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Low	High	High	Very High	Medium				
WQ Threat 2 – ASS runoff (acid drainage / lower pH)	Environmental	Fish kills, red spot disease. Impacts to a range of species.	Low	Low	High	High	Medium	Medium	Medium	Medium	Low
	Socio-economic	Impacts on fish stocks and oysters leases. Reduced amenity.	Low	Low	High	High	Low				
	Heritage	May impact heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Low	Low	High	High	Low				
WQ Threat 3 – Agricultural runoff pollution (sediment, chemical nutrients)	Environmental	Smothering. Fouling of seagrass and reduced light penetration; changes in distribution. Increased algal productivity (e.g. blooms). Impact to aquatic ecosystem health.	Low	Low	High	High	Medium	Medium	High	High	High
	Socio-economic	Closure of beaches. Closure - no direct harvesting for oyster growers.	Low	Low	High	High	Medium				
	Heritage	May impact heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Low	Low	High	High	Medium				
WQ Threat 4 – Point source discharge (water pollution)	Environmental	Smothering. Fouling of seagrass and reduced light penetration; changes in distribution. Increased algal productivity (e.g. blooms). Impact to aquatic ecosystem health.	Low	High	Medium	High	Low	Medium	High	High	High
	Socio-economic	Closure of beaches. Closure - no direct harvesting for oyster growers.	Low	High	Medium	High	Medium				
	Heritage	May impact heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Low	High	Medium	High	Medium				
WQ Threat 5 – Marine debris (pollution, wildlife disturbance)	Environmental	Entanglement, ingestion, bioaccumulation.	High	Very High	Very High	Very High	High	High	High	High	High
	Socio-economic	Visual impacts.	Medium	Medium	Medium	Medium	Medium				
	Heritage	Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Low	Medium	Medium	Medium	Medium				
BD Threat 1 – Land clearing (habitat loss, water pollution)	Environmental	Fragmentation and loss vegetation communities, including those that comprise habitat for conservation significant species such as koala. Loss of wildlife corridors.	High	High	High	Very High	High	High	High	High	High
	Socio-economic	Loss of natural character. Impacts on visual amenity.	High	High	High	Very High	High				

Threat (& Stressor)	Aspect	Descriptor	Stage 1 Present Day Risk (source: PSC, 2020)*			Stage 1 Future Risk (source: PSC, 2020)*	Updated Stage 3 Risk Assessment				
			Open Coast	Outer Port	Inner Port		Present Day Risk by Aspect	Consolidated Present Day Risk	2040	2070	2120
	Heritage	Direct impacts to heritage sites (e.g. scarred trees). Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	High	High	Very High	High				
BD Threat 2 – Biosecurity (weeds, pests & disease)	Environmental	Displacement and predation of native species, including seagrass.	High	High	High	High	High	High	High	High	High
	Socio-economic	Loss of amenity. Access impacts. Cost of control. Impacts to oyster aquaculture.	High	High	High	High	High				
	Heritage	Impacts to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	High	High	High	High	High				
LC Threat 1 – Land contamination (water pollution)	Environmental	Lethal and sub-lethal impacts to species and communities.	Medium	Medium	Medium	High	High	High	High	High	High
	Socio-economic	Impacts to amenity, public health, property prices, primary industry and land management restrictions. Groundwater and land management restrictions within the Water Management Area.	Medium	Medium	High	High	High				
	Heritage	Impacts to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	Medium	High	High	High				
ME Threat 1 – Mining & extractive industries (physical disturbance, groundwater impacts, water pollution)	Environmental	Damage to/loss of habitat. Over-exploitation of fisheries.	Very High	Low	Medium	Medium	High	High	High	High	High
	Socio-economic	Reduced amenity. Loss of natural character. Impact to recreationally and commercially fished species.	High	Low	Medium	Medium	High				
	Heritage	Direct impact to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Very High	Low	High	Very High	High				
RA Threat 1 – Boating pressures (Physical disturbance, water pollution)	Environmental	Damage to/loss of aquatic habitats (e.g. seagrass), wildlife strike, water quality impacts, disturbance of sensitive species.	Low	High	Medium	High	Medium	Medium	High	High	High
	Socio-economic	Impacts on public safety and amenity due to user behaviour and conflicts.	Low	Medium	Low	High	Medium				
	Heritage	Potential for direct impacts to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Medium	High	Medium	High	Medium				
RA Threat 2 – Encroachment onto public land (Physical disturbance, altered natural coastal processes, loss of access)	Environmental	Damage to/loss of habitat, including that used by conservation significant species. Disturbance of sensitive species (e.g. wader birds).	Medium	Medium	Medium	High	Medium	Medium	High	High	High
	Socio-economic	Reduced amenity and public access. Loss of natural character. Safety concerns. Significant maintenance burden on council.	Low	Very High	High	Very High	Medium				
	Heritage	Impacts to heritage sites. Impacts to Aboriginal cultural values / traditional resource use / cultural activities.	Very High	Very High	Very High	Very High	Medium				

*NA = Not applicable. Note: 'Very high' is not a risk rating in Table 3 and was assumed to correspond to a 'High' rating.

Appendix D

Full List of Management Options



PORT STEPHENS COUNCIL

RG-00-12

Port Stephens Coastal Management Program

All Potential Management Options

Legend

- Study Area

Coastal Threat Category

- Biodiversity Threat
- Coastal Hazard Threat
- Land Contamination Threat
- Recreational Activity Threat
- Water Quality Threat

0 1 2 3 km

Job Number: J1702
Scale : 1:115000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

Option ID	Key Threat Addressed	Source	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)
CH001	All CH Threats	CMP Team	Y	Y	Y	Y	Y	Coastal hazard monitoring strategy.	Monitoring & Evaluation	All		High	Extreme
CH002	All CH Threats	CMP Stage 2	Y			Y	Y	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	Monitoring & Evaluation	All		High	Extreme
CH003	All CH Threats	CMP Team	Y	Y	Y	Y	Y	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	Aboriginal Heritage	All		High	Extreme
CH004	CH Threat 1	Community	Y			Y	Y	Coordinate with the Salamander Bay Recycling Centre to use concrete bollards for beach stabilisation.	Coastal Erosion Protection - Works	All		Medium	High
CH005	CH Threat 5	CMP Team	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Coastal Hazard Protection - Policy	Tilligerry Peninsula		Low	Extreme
CH006	CH Threat 4	Agency	Y	Y		Y	Y	Liaise with the asset owner for the Fullerton Cove Ring Drain levee regarding the long-term approach to management of the levee (e.g. potential for raising) to understand the potential implications for coastal inundation risk in this part of the study area.	Coastal Hazard Protection - Policy	Salt Ash		High	Extreme
CH007	CH Threat 3	CMP Team	Y			Y	Y	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Aboriginal Heritage	Stockton Sand Dunes		Medium	High
CH008	CH Threat 1	Council				Y	Y	Undertake a planned retreat of built assets to accommodate the recession of the shoreline adjacent to the Shoal Bay boat ramp over time.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp	Medium	High
CH009	CH Threat 2	CMP Team	Y	Y	Y	Y	Y	Install additional Coast Snap monitoring point at Fingal Beach.	Monitoring & Evaluation	All		Medium	Extreme
CH010	All CH Threats	Community	Y	Y	Y	Y	Y	Update Section 10.7 certificates to include land subject to development controls relating to coastal hazards.	Land Use Planning	All		High	Extreme
CH011	All CH Threats	Community	Y	Y	Y	Y	Y	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	Land Use Planning	All		High	Extreme
CH012	CH Threats 4 and 5	CMP Team	Y	Y	Y	Y	Y	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from tidal inundation aimed at the ongoing provision of access for the community in future.	Land Use Planning	All		High	Extreme
CH013	CH Threat 1	Community	Y			Y	Y	Artificial reef to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay		Medium	High
CH014	CH Threat 1	CMP Team	Y			Y	Y	Coastal protection works for Shoal Bay Beach.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High
CH015	CH Threat 1	CMP Team	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High
CH016	CH Threat 1	CMP Team	Y			Y	Y	Groyne at Western Shoal Bay to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High
CH017	CH Threat 1	CMP Team	Y			Y	Y	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Coastal Erosion Protection - Works	Shoal Bay	Along beach near Shoal Bay Road	Medium	High
CH018	CH Threat 1	Community	Y	Y		Y	Y	Relocate Shoal Bay Road to mitigate risk from coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Road	Medium	High
CH019	CH Threat 1	CMP Team	Y			Y	Y	Sand carting/trucking to improve beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	High

Option ID	Key Threat Addressed	Source	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)
CH020	CH Threat 1	CMP Team	Y			Y	Y	Nourishment for coastal erosion hazard mitigation.	Public Access & Recreational Amenity	Bagnalls Beach	Western end of Bagnalls Beach	Medium	High
CH021	CH Threat 1	Community	Y			Y	Y	Artificial reef to mitigate coastal erosion.	Coastal Erosion Protection - Works	Sandy Point		Medium	High
CH022	CH Threat 1	Community	Y			Y	Y	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	Coastal Erosion Protection - Works	Sandy Point		Medium	High
CH023	CH Threat 1	Community	Y			Y	Y	Undertake maintenance works / repairs to the existing rock revetment.	Coastal Erosion Protection - Works	Sandy Point	Eastern shoreline	Medium	High
CH024	CH Threat 1	CMP Team	Y			Y	Y	Repair existing sandbag structure.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High
CH025	CH Threat 1	CMP Team	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High
CH026	CH Threat 1	CMP Team	Y			Y	Y	Repair existing 125m seawall near Conroy Park.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High
CH027	CH Threat 1	CMP Team	Y			Y	Y	Sand backpassing to mitigate against coastal erosion.	Coastal Erosion Protection - Works	Sandy Point		Medium	High
CH028	CH Threat 1	CMP Team	Y			Y	Y	Beach nourishment to mitigate against coastal erosion.	Coastal Erosion Protection - Works	Corlette	Shoreline near Danalene Parade	Medium	High
CH029	CH Threat 5	CMP Team	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Coastal Hazard Protection - Policy	Salamander Bay	Foreshore Drive	Low	Extreme
CH030	CH Threats 4 and 5	CMP Team	Y	Y		Y	Y	Flood gate installation/upgrade to mitigate against coastal and tidal inundation hazards.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	High	Extreme
CH031	CH Threat 5	CMP Team	Y	Y		Y	Y	Retreat to mitigate tidal inundation risk.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	Low	Extreme
CH032	CH Threats 4 and 5	CMP Team	Y	Y		Y	Y	Road raising to mitigate coastal and tidal inundation hazard.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	High	Extreme
CH033	CH Threat 1	Community	Y			Y	Y	Continue rock revetment to protect boardwalk.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High
CH034	All CH Threats	CMP Team	Y			Y	Y	Establish trigger points for action to consider other possible adaptation options for this location.	Coastal Hazard Protection - Policy	Tanilba	Mallabula Beach west of boat ramp	High	Extreme
CH035	Ch Threat 4	CMP Team	Y			Y	Y	Flood gate installation to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Tanilba	Mallabula Beach east of boat ramp	High	Extreme
CH036	CH Threat 1	Community	Y			Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) and rectification of undermined sections of boardwalk.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High
CH037	CH Threat 1	Community	Y			Y	Y	Oyster reef to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High
CH038	CH Threat 1	Community	Y			Y	Y	Realign boardwalk landward to accommodate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High
CH039	Ch Threat 4	CMP Team	Y		P	Y	Y	Artificial raising of berm/dune to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Soldiers Point	Shoreline south of Seaview Crescent	High	Extreme
CH040	CH Threat 1	CMP Team	Y		P	Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Soldiers Point	East of Soldiers Point Road, south of jetty	Medium	High

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CH041	CH Threat 1	CMP Team	Y		P	Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Soldiers Point	East of Soldiers Point Road, south of jetty	Medium	High
CH042	CH Threat 1	CMP Team	Y			Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	near Peace Parade	Medium	High
CH043	CH Threat 1	CMP Team	Y			Y	Y	Offshore breakwater to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	near Peace Parade	Medium	High
CH044	CH Threat 4	CMP Team	Y			Y	Y	Artificial raising of berm/dune to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Lemon Tree Passage	Cooks Parade, south of marina	High	Extreme
CH045	CH Threat 1	CMP Team	Y			Y	Y	Living shoreline to mitigate risk from coastal erosion.	Coastal Erosion Protection - Works	Lemon Tree Passage	Cooks Parade, south of marina	Medium	High
CH046	CH Threat 4	Community	Y			Y	Y	Bund to prevent inundation / modification of the seawall to mitigate coastal inundation risk.	Coastal Inundation Protection - Works	Lemon Tree Passage	From boat ramp to Henderson Park and Kooindah Park	High	Extreme
CH047	CH Threat 1	CMP Team	Y			Y	Y	Mangrove colonisation to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Henderson Park west of the creek and incl. Kooindah Park	Medium	High
CH048	CH Threat 1	CMP Team	Y	P		Y	Y	Repair existing seawall.	Coastal Erosion Protection - Works	Salamander Bay	West of bridge, Foreshore Drive	Medium	High
CH049	CH Threat 1	CMP Team	Y	P		Y	Y	Terrace seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Salamander Bay	West of bridge, Foreshore Drive	Medium	High
CH050	CH Threat 1	CMP Team	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High
CH051	CH Threat 1	CMP Team	Y			Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High
CH052	CH Threat 1	CMP Team	Y			Y	Y	Offshore breakwater to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High
CH053	CH Threat 1	Community	Y			Y	Y	Breakwater to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High
CH054	CH Threat 1	Community	Y			Y	Y	Seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High
CH055	CH Threat 1	Community	Y			Y	Y	Living shoreline (e.g. oyster reefs, or mangrove colonisation) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High
CH056	CH Threat 1	Community	Y			Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High
CH057	CH Threat 1	Community	Y			Y	Y	Rock revetment to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High
CH058	CH Threat 1	Community	Y			Y	Y	Address stormwater induced erosion.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High
CH059	CH Threat 1	CMP Team	Y			Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High
CH060	CH Threat 1	CMP Team	Y			Y	Y	New seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High
CH061	CH Threat 1	CMP Team	Y			Y	Y	Oyster reef to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High
CH062	CH Threat 1	Community	Y	P		Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High
CH063	CH Threat 1	CMP Team	Y	P		Y	Y	Mangrove colonisation to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High

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CH064	CH Threat 1	CMP Team	Y	P		Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High
CH065	CH Threat 1	CMP Team	Y	P		Y	Y	Rock revetment to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High
CH066	CH Threat 1	CMP Team	Y	Y		Y	Y	Living shoreline to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High
CH067	RA Threat 2	Community	Y	Y		Y	Y	Remove rocks placed by residents in this location.	Biodiversity Conservation	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High
CH068	CH Threats 1 and 4	CMP Team	Y	Y		Y	Y	Construct a break wall along Tilligerry Creek to prevent erosion and coastal inundation.	Coastal Inundation Protection - Works	Lemon Tree Passage		High	Extreme
CH069	CH Threat 1	CMP Team	Y			Y	Y	Beach nourishment for improved beach access and amenity.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp, Shoal Bay Road	Medium	High
CH070	CH Threat 1	CMP Team	Y			Y	Y	New seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp, Shoal Bay Road	Medium	High
CH071	CH Threat 3	CMP Team	Y	Y		Y	Y	Coordinate with sand mining companies to enable their activities to manage the risk of aeolian sand transport.	Coastal Erosion Protection - Works	Open Coast		Medium	High
CH072	CH Threats 1 and 2	Community	Y	Y	Y	Y	Y	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	Coastal Erosion Protection - Works	Inner Port Outer Port		Medium	Extreme
CH073	All CH Threats	Council	Y			Y	Y	Develop a climate change adaptation strategy for the Shoal Bay precinct.	Coastal Hazard Protection - Policy	Shoal Bay		High	Extreme
CH074	RA Threat 2	Council	Y	Y	Y	Y	Y	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Coastal Hazard Protection - Policy	All		Medium	High
CH075	CH Threat 7	CMP Team	Y	Y		Y	Y	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	Coastal Inundation Protection - Works	All		High	High
CH076	CH Threat 1	CMP Team	Y	Y		Y	Y	Oyster reef to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High
CH077	CH Threat 1	CMP Team		Y		Y	Y	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	Coastal Erosion Protection - Works	All		Medium	High
CH078	CH Threat 1	Council	Y			Y	Y	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	Coastal Erosion Protection - Works	Swan Bay	Approx. 340 m of seawall adjacent to Waterfront Road.	Medium	High
CH079	CH Threat 3	Council	Y			Y	Y	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	Dune Transgression - Works	Birubi Point		Medium	High
CH080	CH Threat 1	Council	Y			Y	Y	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Nelson Bay	Nelson Bay Beach	Medium	High
CH081	CH Threat 4	CMP Team		Y		Y	Y	Install tide gates/flaps on priority stormwater outlets.	Coastal Inundation Protection - Works	All		High	Extreme
CH082	All CH Threats	Agency	Y			Y	Y	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	Coastal Hazard Protection - Policy	National Parks & Nature Reserves		High	Extreme
CH083	CH Threat 5	CMP Team				Y	Y	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	Coastal Inundation Protection - Works	All		Low	Extreme

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DI001	ME Threat 1	Council	Y	Y	Y	Y	Y	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	Governance	All		High	High
E001	BD Threat 2	CMP Team	Y	Y	Y	Y	Y	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.	Biodiversity Conservation	All		High	High
E002	RA Threat 2	Community	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Biodiversity Conservation	One Mile Beach		Medium	High
E003	BD Threat 2	Agency	Y	Y	Y	Y	Y	Develop and implement a community education program about biosecurity risks and the management of pests and weeds on private land.	Community Engagement	All		High	High
E004	BD Threat 2	CMP Team	Y	Y		Y	Y	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	Biodiversity Conservation	Mambo Wetlands		High	High
E005	BD Threat 2	CMP Team	Y		Y	Y	Y	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.	Biodiversity Conservation	Soldiers Point		High	High
E006	BD Threat 1	Council	Y	Y		Y	Y	Work with community members to progress the integration of Mambo Wetlands into the Myall Lakes RAMSAR Site No. 994, or alternatively establish it as a new RAMSAR wetland.	Biodiversity Conservation	Mambo Wetlands		High	High

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E007	CH Threat 5	Community	Y	Y		Y	Y	Undertake a water balance study for Mambo Wetlands to understand the wetland hydrology, to include consideration of climate extremes (e.g. droughts) and the potential impacts of climate change and sea level rise on the wetlands. The study should also consider the likely wetland hydrology prior to the development of any hydraulic controls at the interface with the estuary (e.g. construction of Foreshore Drive) and changes that may have arisen since the replacement of the culverts with a bridge following the March 2021 storm event.	Biodiversity Conservation	Mambo Wetlands		Low	Extreme
E008	BD Threat 1	CMP Team	Y	Y		Y	Y	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	Biodiversity Conservation	Mambo Wetlands		High	High
E009	BD Threat 2	CMP Team	Y			Y	Y	Re-plant locally endemic species to replace dying and falling old banksia trees in the Boat Harbour.	Biodiversity Conservation	Boat Harbour	Boat Harbour Beach, Boat Harbour Peninsula	High	High
E010	LC Threat 1	Community	Y	Y		Y	Y	Clean up the dumped building materials along Tilligerry Creek.	Water Quality - Works	Lemon Tree Passage		High	High
E011	RA Threat 2	Community	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Biodiversity Conservation	Fingal Bay		Medium	High
E012	RA Threat 2	CMP Stage 2	Y	Y	Y	Y	Y	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Public Access & Recreational Amenity	All		Medium	High
E013	RA Threat 2	Agency	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	Aboriginal Heritage	Open Coast	Stockton Beach	Medium	High
E014	WQ Threat 1	Agency	Y	Y		Y	Y	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	Biodiversity Conservation	All	Port Stephens-Great Lakes Marine Park	Medium	High
E015	RA Threat 2	CMP Team	Y			Y	Y	Undertake an audit of formal and informal beach access ways on land under the care and control of Council and identify beach accesses that can be rationalised and any associated dune or shoreline rehabilitation works, or other works to prevent informal beach access at these locations.	Biodiversity Conservation	All		Medium	High
E016	RA Threat 2	CMP Team	Y			Y	Y	Encourage local volunteer groups to support dune rehabilitation activities.	Biodiversity Conservation	All	Council managed land	Medium	High
E017	RA Threat 2	Council	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	Biodiversity Conservation	All	Council managed land	Medium	High
E018	BD Threat 2	Council	Y			Y	Y	Prepare a new, updated Plan of Management for Mambo Wetlands.	Biodiversity Conservation		Mambo Wetlands	High	High
E019	BD Threat 2	Agency	Y			Y	Y	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	Biodiversity Conservation		National Parks & Nature Reserves	High	High
HE001	RA Threat 2	Agency	Y	Y	Y	Y	Y	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Aboriginal Heritage	All		Medium	High

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HE002	BD Threat 2	CMP Team	Y		Y	Y	Y	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	Aboriginal Cultural Management	Soldiers Point		High	High
RA001	RA Threat 2	Council	Y	Y	Y	Y	Y	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Coastal Hazard Protection - Policy	All		Medium	High
RA002	RA Threat 1	CMP Team	Y			Y	Y	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Public Access & Recreational Amenity	All		Medium	High
RA003	RA Threat 2	CMP Team	Y			Y	Y	Develop a governance framework for coastal protection structures of unknown management status.	Governance	All	Inner Port Outer Port	Medium	High
RA004	RA Threat 2	Council	Y			Y	Y	Re-classify 109 Foreshore Drive from operational to community land commensurate with its historic designation as a reserve.	Public Access & Recreational Amenity	Salamander Bay		NA	NA
RA005	RA Threat 2	Community	Y			Y	Y	Address safety risk associated with roots and other debris in the intertidal zone by providing warning signage.	Public Access & Recreational Amenity	Kangaroo Point		Medium	High
RA010	CH Threat 2	CMP Team	Y			Y	Y	Beach nourishment for improved beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	Extreme
RA011	CH Threat 2	CMP Team	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	Extreme
RA012	RA Threat 2	CMP Team	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	High
RA013	RA Threat 2	CMP Team	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Nelson Bay	Western end of Nelson Bay Beach	Medium	High
RA014	CH Threat 2	CMP Team	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Nelson Bay	Western end of Nelson Bay Beach	Medium	Extreme
RA015	RA Threat 2	Community	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Sandy Point	Conroy Park	Medium	High
RA016	CH Threat 2	Community	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Sandy Point	Western side of Sandy Point	Medium	Extreme
RA017	RA Threat 2	CMP Team	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High
RA018	CH Threat 1	CMP Team	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High
RA019	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Corlette	Around 130 m of shoreline near Danalene Parade	Medium	High

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RA020	CH Threat 1	CMP Team	Y			Y	Y	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Tanilba	Mallabula Beach west of boat ramp	Medium	High
RA021	RA Threat 2	CMP Team	Y		P	Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Soldiers Point	Shoreline east of Soldiers Point Road, south of jetty	Medium	High
RA022	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Near Peace Parade	Medium	High
RA023	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Henderson Park west of the creek and incl. Kooindah Park	Medium	High
RA024	RA Threat 2	CMP Team	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Nelson Bay	Little Beach boat ramp / Nelson Bay Beach	Medium	High
RA025	RA Threat 2	CMP Team	Y			Y	Y	Access management & dune rehabilitation.	Public Access & Recreational Amenity	Shoal Bay	Western 1km of Shoal Bay Beach, west of Shoal Bay Road	Medium	High
RA026	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Salamander Bay	Roy Wood Reserve	Medium	High
RA027	RA Threat 2	CMP Team	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Salamander Bay	Roy Wood Reserve	Medium	High
RA028	RA Threat 2	CMP Team	Y	P		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Salamander Bay	Foreshore Drive	Medium	High
RA029	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High
RA030	RA Threat 2	Community	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Dutchmans Beach	Western end of Beach	Medium	High
RA031	CH Threat 1	Community	Y			Y	Y	Repair or replace stairs and fix fencing to reinstate public access from the car park.	Public Access & Recreational Amenity	Dutchmans Beach	Western end of Beach	Medium	High
RA032	RA Threat 2	CMP Team	Y			Y	Y	Access management & dune rehabilitation.	Public Access & Recreational Amenity	Dutchmans Beach		Medium	High
RA033	CH Threat 1	Community	Y			Y	Y	Sand management to improve beach access and amenity.	Public Access & Recreational Amenity	Dutchmans Beach		Medium	High
RA034	RA Threat 2	CMP Team	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Nelson Bay		Medium	High
RA035	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Soldiers Point	Cook Street/Foreshore Drive	Medium	High
RA036	RA Threat 2	CMP Team	Y			Y	Y	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	Public Access & Recreational Amenity	Kangaroo Point		Medium	High
RA037	RA Threat 2	CMP Team	Y			Y	Y	Minor shoreline re-profiling and landscaping works.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High
RA038	RA Threat 2	CMP Team	Y			Y	Y	Access management & landscaping works.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High
RA039	RA Threat 2	Council	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Tanilba Bay West	Medium	High

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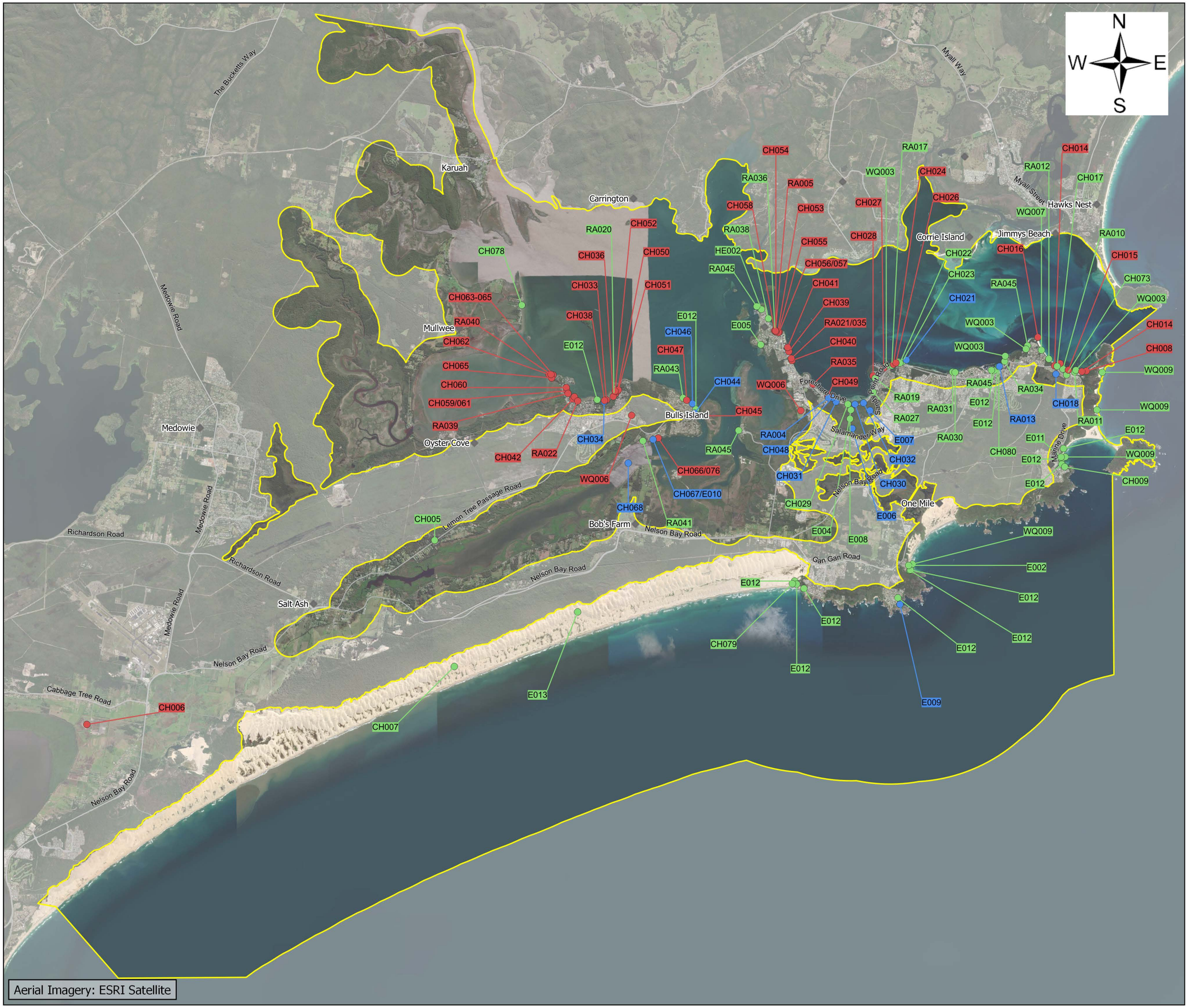
RA040	RA Threat 2	Community	Y	P		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Sunset Park	Medium	High
RA041	RA Threat 2	Community	Y	Y		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High
RA042	RA Threat 2	Community	Y	Y		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High
RA043	RA Threat 2	Community	Y			Y	Y	Undertake fencing and landscaping works to stabilise the foreshore .	Public Access & Recreational Amenity	Lemon Tree Passage	Henderson Park (west of the creek) and Kooindah Park	Medium	High
RA044	BD Threat 1	CMP Team	Y			Y	Y	Dune rehabilitation for biodiversity conservation and to provide coastal protection.	Biodiversity Conservation	Shoal Bay	Near the boat ramp, Shoal Bay Road	High	High
RA045	CH Threat 7	Community	Y			Y	Y	Dredging to improve access to the boat ramp and Soldiers Point marina.	Public Access & Recreational Amenity	Soldiers Point	Boat ramp and marina	High	High
RA046	CH Threat 7	Agency	Y			Y	Y	Undertake dredging to remove accumulated sediment in Nelson Bay marina and place on adjacent beach.	Recreational Amenity	Nelson Bay	Nelson Bay Marina	High	High
WQ001	All WQ Threats	CMP Team	Y	Y		Y	Y	Develop a water quality monitoring program for Port Stephens.	Monitoring & Evaluation	All		High	High
WQ002	All WQ Threats	CMP Stage 2	Y	Y		Y	Y	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	Monitoring & Evaluation	All		High	High
WQ003	All WQ Threats	CMP Stage 2	Y	Y		Y	Y	Implement the Port Stephens Water Quality Monitoring Program and undertake annual reporting.	Monitoring & Evaluation	All		High	High
WQ004	BD Threat 1	CMP Stage 2					Y	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Water Quality - Policy	All		High	High
WQ005	WQ Threat 1	CMP Stage 2	Y	Y		Y	Y	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	Community Engagement	All		Medium	High
WQ006	WQ Threat 4	CMP Team	Y	Y		Y	Y	In order to manage the potential/existing impacts on Port Stephens, support the development of Landfill Aftercare Management and Rehabilitation Works Plans for the de-commissioned waste facilities at Salamander Bay and Lemon Tree Passage, as proposed under Council's Waste Management Strategy 2021-2031.	Water Quality - Works	Salamander Bay Lemon Tree Passage		Medium	High
WQ007	WQ Threat 4	CMP Team	Y			Y	Y	Provide an alternate (back up) energy supply for sewerage plant at Shoal Bay to minimise the risk of sewage overflows during loss of electricity supply via the grid.	Water Quality - Works	Shoal Bay		Medium	High

Option ID	Key Threat Addressed	Source	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)
WQ008	WQ Threat 1	Community	Y			Y	Y	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Water Quality - Policy	All		Medium	High
WQ009	All WQ Threats	CMP Team						Beachwatch monitoring program for recreational water quality at ocean beaches (continued program)	Water Quality - Works	Box Beach Fingal Beach One Mile Beach Zenith Beach		High	High
WQ010	WQ Threat 5	CMP Team	Y			Y	Y	Install tangle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters.	Biodiversity Conservation	All		High	High
WQ011	WQ Threat 5	CMP Team	Y			Y	Y	Develop targeted education program and materials to reduce recreational fishing waste impacts on Port Stephens.	Community Engagement	All		High	High

Appendix E

Feasibility Assessment Outcomes



PORT STEPHENS COUNCIL

RG-00-13

Port Stephens Coastal Management Program

Feasibility Assessment Outcome

Legend

- Study Area

Feasibility Assessment Outcome

- Feasible / Progress to Viability Assessment
- Not Feasible / Don't Progress to Viability Assessment
- Other*

*This includes options that were discontinued as a stand-alone options, such as Option RA046 which was incorporated into Option E012, and options that were the same or very similar, such as Option RA042 which was in the same general location and incorporated into Option RA041.

0 1 2 3 km

Job Number: J1702
Scale : 1:115000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
CH001	All CH Threats	Y	Y	Y	Y	Y	Coastal hazard monitoring strategy.	Monitoring & Evaluation	All		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH002	All CH Threats	Y			Y	Y	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	Monitoring & Evaluation	All		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH003	All CH Threats	Y	Y	Y	Y	Y	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	Aboriginal Heritage	All		High	Extreme	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
CH004	CH Threat 1	Y			Y	Y	Coordinate with the Salamander Bay Recycling Centre to use concrete bollards for beach stabilisation.	Coastal Erosion Protection - Works	All		Medium	High	**Unknown**	**No**	**No**	**Do not proceed** - not feasible from engineering and approvals perspective.
CH005	CH Threat 5	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Coastal Hazard Protection - Policy	Tilligerry Peninsula		Low	Extreme	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
CH006	CH Threat 4	Y	Y		Y	Y	Liaise with the asset owner for the Fullerton Cove Ring Drain levee regarding the long-term approach to management of the levee (e.g. potential for raising) to understand the potential implications for coastal inundation risk in this part of the study area.	Coastal Hazard Protection - Policy	Salt Ash		High	Extreme	**Yes**	**No**	**NA**	**Do not proceed** - this option is located outside the study area. In addition, Council advises that they already undertake regular engagement with the asset owner and consider this 'business as usual'.
CH007	CH Threat 3	Y			Y	Y	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Aboriginal Heritage	Stockton Sand Dunes		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - the proposed works are located wholly on Worimi Conservation Lands and would be 100% public beneficiary.
CH008	CH Threat 1				Y	Y	Undertake a planned retreat of built assets to accommodate the recession of the shoreline adjacent to the Shoal Bay boat ramp over time.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - Council is already undertaking some work to 'retreat' via the relocation of access stairs and relocation or removal of other assets. Further to this activity, it is recommended a broader strategic approach to the locality be considered as part of the proposed adaptation strategy.
CH009	CH Threat 2	Y	Y	Y	Y	Y	Install additional Coast Snap monitoring point at Fingal Beach.	Monitoring & Evaluation	All		Medium	Extreme	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
CH010	All CH Threats	Y	Y	Y	Y	Y	Update Section 10.7 certificates to include land subject to development controls relating to coastal hazards.	Land Use Planning	All		High	Extreme	**Yes**	**Yes**	**NA**	**Already completed**
CH011	All CH Threats	Y	Y	Y	Y	Y	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	Land Use Planning	All		High	Extreme	**Yes**	**Yes**	**NA**	**Progress to viability assessment**

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
CH012	CH Threats 4 and 5	Y	Y	Y	Y	Y	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from tidal inundation aimed at the ongoing provision of access for the community in future.	Land Use Planning	All		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH013	CH Threat 1	Y			Y	Y	Artificial reef to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay		Medium	High	**Unknown**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH014	CH Threat 1	Y			Y	Y	Coastal protection works for Shoal Bay Beach.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - While there is a historical coastal erosion issue, there are no erosion hazard extents for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also a likelihood of both public and private beneficiaries, which would required detailed economic analyses. Hence, the option requires completion of a coastal erosion hazard assessment (option CH072) before it could be progressed. To be considered in the next CMP (2035-2045). In the interim, **consider in the CZEAS.**
CH015	CH Threat 1	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - While there is a historical coastal erosion issue, there are no erosion hazard extents for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also a likelihood of both public and private beneficiaries, which would required detailed economic analyses. Hence, the option requires completion of a coastal erosion hazard assessment (option CH072) before it could be progressed. To be considered in the next CMP (2035-2045).
CH016	CH Threat 1	Y			Y	Y	Groyne at Western Shoal Bay to mitigate coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Beach	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - While there is a historical coastal erosion issue, there are no erosion hazard extents for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also a likelihood of both public and private beneficiaries, which would

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
																required detailed economic analyses. Hence, the option requires completion of a coastal erosion hazard assessment (option CH072) before it could be progressed. To be considered in the next CMP (2035-2045).
CH017	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Coastal Erosion Protection - Works	Shoal Bay	Along beach near Shoal Bay Road	Medium	High	**Unknown**	**Yes**	**Yes**	**Progress to viability assessment as an 'investigate & design option'** - While there is a historical coastal erosion issue, there is no erosion hazard mapping for this location to enable quantification of the risk to the road and timeframe within which they would be impacted into the future. There is also potential for both public and private beneficiaries, which would required detailed economic analyses. Hence, the option requires completion of the coastal erosion hazard assessment (option CH072) before it could be progressed to the implementation phase.
CH018	CH Threat 1	Y	Y		Y	Y	Relocate Shoal Bay Road to mitigate risk from coastal erosion.	Coastal Erosion Protection - Works	Shoal Bay	Shoal Bay Road	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - While there is a historical coastal erosion issue, there are no erosion hazard extents for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also a likelihood of both public and private beneficiaries, which would required detailed economic analyses. Hence, the option requires completion of a coastal erosion hazard assessment (option CH072) before it could be progressed. **To be considered in the adaptation strategy for this locality (refer Option CH073).**
CH019	CH Threat 1	Y			Y	Y	Sand carting/trucking to improve beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA011**.**

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CH020	CH Threat 1	Y			Y	Y	Nourishment for coastal erosion hazard mitigation.	Public Access & Recreational Amenity	Bagnalls Beach	Western end of Bagnalls Beach	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider this option in next CMP (2035-2045).
CH021	CH Threat 1	Y			Y	Y	Artificial reef to mitigate coastal erosion.	Coastal Erosion Protection - Works	Sandy Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered.
CH022	CH Threat 1	Y			Y	Y	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	Coastal Erosion Protection - Works	Sandy Point		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - Previous studies confirm there is a sand deficit in this location resulting in long-term erosion. However, the proposed works are likely to have both private and public beneficiaries and would require a detailed economic assessment to comply with the CM Act and CM Manual. This economic assessment is informed by coastal erosion hazard mapping, which is unavailable for the site. However, it is possible to progress this option as an 'investigate and design' option until the coastal erosion hazard mapping is available (refer option CH072). **The implementation/construction could be considered for the next CMP (2035-2045).**

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
CH023	CH Threat 1	Y			Y	Y	Undertake maintenance works / repairs to the existing rock revetment.	Coastal Erosion Protection - Works	Sandy Point	Eastern shoreline	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH024	CH Threat 1	Y			Y	Y	Repair existing sandbag structure.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High	**Yes**	**No**	**Yes**	**Not feasible** - sandbags only permitted for emergency works**.**
CH025	CH Threat 1	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered.
CH026	CH Threat 1	Y			Y	Y	Repair existing 125m seawall near Conroy Park.	Coastal Erosion Protection - Works	Sandy Point	Conroy Park	Medium	High	**Yes**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH027	CH Threat 1	Y			Y	Y	Sand backpassing to mitigate against coastal erosion.	Coastal Erosion Protection - Works	Sandy Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted into the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered.
CH028	CH Threat 1	Y			Y	Y	Beach nourishment to mitigate against coastal erosion.	Coastal Erosion Protection - Works	Corlette	Shoreline near Danalene Parade	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs

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																to be completed before it could be considered.
CH029	CH Threat 5	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Coastal Hazard Protection - Policy	Salamander Bay	Foreshore Drive	Low	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH030	CH Threats 4 and 5	Y	Y		Y	Y	Flood gate installation/upgrade to mitigate against coastal and tidal inundation hazards.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	High	Extreme	**Yes**	**Yes**	**Yes**	**Do not proceed as stand-alone option** - to be considered as part of holistic adaptation strategy for the locality (refer Option CH043).
CH031	CH Threat 5	Y	Y		Y	Y	Retreat to mitigate tidal inundation risk.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	Low	Extreme	**Yes**	**Yes**	**Yes**	**Do not proceed as stand-alone option** - to be considered as part of holistic adaptation strategy for the locality (refer Option CH043).
CH032	CH Threats 4 and 5	Y	Y		Y	Y	Road raising to mitigate coastal and tidal inundation hazard.	Coastal Inundation Protection - Works	Salamander Bay	Foreshore Drive	High	Extreme	**Yes**	**Yes**	**No**	**Do not proceed as stand-alone option** - may not be feasible from engineering perspective. To be further considered as part of holistic adaptation strategy for the locality (refer Option CH043).
CH033	CH Threat 1	Y			Y	Y	Continue rock revetment to protect boardwalk.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed -** there is no erosion hazard mapping for this location and there is no clear indication that the boardwalk structure is at imminent risk and requires formal coastal protection works.
CH034	All CH Threats	Y			Y	Y	Establish trigger points for action to consider other possible adaptation options for this location.	Coastal Hazard Protection - Policy	Tanilba	Mallabula Beach west of boat ramp	High	Extreme	**Unknown**	**Yes**	**Yes**	**Do not proceed as a stand-alone option** - To be considered as part of holistic adaptation strategy for this locality (refer Option CH005).
CH035	Ch Threat 4	Y			Y	Y	Flood gate installation to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Tanilba	Mallabula Beach east of boat ramp	High	Extreme	**Yes**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH036	CH Threat 1	Y			Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) and rectification of undermined sections of boardwalk.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to accommodate erosion and accretion cycles (noting also an adaptation strategy is proposed for

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																the Tilligerry Peninsula, Option CH005). Given these works would have a longer design life and the risk profile over time is unknown, it is recommended the option not proceed at this time. Consider for the next CMP (2035-2045).
CH037	CH Threat 1	Y			Y	Y	Oyster reef to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to accommodate erosion and accretion cycles (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Given these works would have a longer design life and the risk profile over time is unknown, it is recommended the option not proceed at this time. Consider for the next CMP (2035-2045).
CH038	CH Threat 1	Y			Y	Y	Realign boardwalk landward to accommodate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Mallabula Beach west of boat ramp	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed under CMP** - there is no erosion hazard mapping for this location and Council advises there is no clear indication that the boardwalk structure is at imminent risk and requires formal coastal protection works. **Consider a trigger for action in the CZEAS.**
CH039	Ch Threat 4	Y		P	Y	Y	Artificial raising of berm/dune to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Soldiers Point	Shoreline south of Seaview Crescent	High	Extreme	**Yes**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH040	CH Threat 1	Y		P	Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Soldiers Point	East of Soldiers Point Road, south of jetty	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be

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																considered. Consider for the next CMP (2035-2045).
CH041	CH Threat 1	Y		P	Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Soldiers Point	East of Soldiers Point Road, south of jetty	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider for the next CMP (2035-2045).
CH042	CH Threat 1	Y			Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	near Peace Parade	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to enable the erosion to progress (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Consider for the next CMP (2035-2045).
CH043	CH Threat 1	Y			Y	Y	Offshore breakwater to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	near Peace Parade	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to accommodate cycles of erosion and accretion (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Given these works would have a longer design life and the risk profile over time is unknown, it

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
																is recommended the option not proceed at this time. Consider for the next CMP (2035-2045).
CH044	CH Threat 4	Y			Y	Y	Artificial raising of berm/dune to mitigate coastal inundation hazard.	Coastal Inundation Protection - Works	Lemon Tree Passage	Cooks Parade, south of marina	High	Extreme	**Yes**	**Yes**	**Yes**	**Do not continue as a stand-alone option** - consider as part of a holistic adaptation strategy for locality (refer Option CH005).
CH045	CH Threat 1	Y			Y	Y	Living shoreline to mitigate risk from coastal erosion.	Coastal Erosion Protection - Works	Lemon Tree Passage	Cooks Parade, south of marina	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed -** there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to accommodate cycles of erosion and accretion in public land (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). If the erosion is found to put private properties at risk as well as public land, detailed economic analyse would be required consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider for the next CMP (2035-2045).
CH046	CH Threat 4	Y			Y	Y	Bund to prevent inundation / modification of the seawall to mitigate coastal inundation risk.	Coastal Inundation Protection - Works	Lemon Tree Passage	From boat ramp to Henderson Park and Kooindah Park	High	Extreme	**Yes**	**Yes**	**Yes**	**Do not continue as a stand-alone option** - consider as part of a holistic adaptation strategy for locality (refer Option CH005). Although the park is inundated occasionally, public access could be restricted during a storm in the interim. The coastal inundation is not considered a risk to life or assets at the moment. Any safety risks could be managed by closing the park**.**
CH047	CH Threat 1	Y			Y	Y	Mangrove colonisation to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Henderson Park west of the creek and incl. Kooindah Park	Medium	High	**Unknown**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.

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CH048	CH Threat 1	Y	P		Y	Y	Repair existing seawall.	Coastal Erosion Protection - Works	Salamander Bay	West of bridge, Foreshore Drive	Medium	High	**Yes**	**Yes**	**Yes**	**Do not continue** as a stand-alone option - consider as part of a holistic adaptation strategy for this locality (refer Option CH029).
CH049	CH Threat 1	Y	P		Y	Y	Terrace seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Salamander Bay	West of bridge, Foreshore Drive	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH050	CH Threat 1	Y			Y	Y	Groyne to mitigate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH051	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).

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CH052	CH Threat 1	Y			Y	Y	Offshore breakwater to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Foreshore near Hart Avenue	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH053	CH Threat 1	Y			Y	Y	Breakwater to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High	**Unknown**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH054	CH Threat 1	Y			Y	Y	Seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH055	CH Threat 1	Y			Y	Y	Living shoreline (e.g. oyster reefs, or mangrove colonisation) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).

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CH056	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH057	CH Threat 1	Y			Y	Y	Rock revetment to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Kangaroo Point		Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH058	CH Threat 1	Y			Y	Y	Address stormwater induced erosion.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High	**No**	**Yes**	**Yes**	**Do not proceed** - erosion threat not material.
CH059	CH Threat 1	Y			Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).

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CH060	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH061	CH Threat 1	Y			Y	Y	Oyster reef to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Tanilba Bay West	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - There is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. There is also likely to be both public and private beneficiaries, which would require detailed economic analyses, consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. Consider in next CMP (2035-2045).
CH062	CH Threat 1	Y	P		Y	Y	Beach nourishment to mitigate coastal erosion hazard.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High	**Unknown**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH063	CH Threat 1	Y	P		Y	Y	Mangrove colonisation to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High	**Unknown**	**Yes**	**No**	**Do not proceed** - not feasible from engineering perspective.
CH064	CH Threat 1	Y	P		Y	Y	Living shoreline (e.g. mangrove colonisation or oyster reef) to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to enable cycles of erosion and accretion in the public land, albeit with a loss of trees (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Hence,

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																a coastal erosion hazard assessment (option CH072) should be completed before it could be considered. Consider in next CMP (2035/2045).
CH065	CH Threat 1	Y	P		Y	Y	Rock revetment to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Tanilba	Sunset Park	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to enable cycles of erosion and accretion in the public land, albeit with a loss of trees (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Hence, a coastal erosion hazard assessment (option CH072) should be completed before it could be considered. Consider in next CMP (2035/2045).
CH066	CH Threat 1	Y	Y		Y	Y	Living shoreline to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed -** there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted. It not clear that coastal protection works are required as there is space to enable the erosion to progress through public land (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). If the erosion is found to put private properties at risk as well as public land, detailed economic analyse would be required consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered.
CH067	RA Threat 2	Y	Y		Y	Y	Remove rocks placed by residents in this location.	Biodiversity Conservation	Lemon Tree Passage	Lemon Tree Passage Park between Shore	Medium	High	-	-	-	**Do not proceed as a stand-alone option** - To be considered as part

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										Drive and John Parade						of holistic adaptation strategy for this locality (refer Option CH005).
CH068	CH Threats 1 and 4	Y	Y		Y	Y	Construct a break wall along Tilligerry Creek to prevent erosion and coastal inundation.	Coastal Inundation Protection - Works	Lemon Tree Passage		High	Extreme	**Unknown**	**Yes**	**No**	**Do not proceed as a stand-alone option** - may not be feasible from an engineering perspective. In addition, there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. If the erosion is found to put private properties at risk as well as public land, detailed economic analyse would be required consistent with the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) needs to be completed before it could be considered. It is recommended the proposed adaptation strategy for the Tilligerry Peninsula consider these hazards (refer Option CH005).
CH069	CH Threat 1	Y			Y	Y	Beach nourishment for improved beach access and amenity.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp, Shoal Bay Road	Medium	High	**Yes**	**Yes**	**Yes**	**Do not proceed as stand-alone option** - Incorporated into option RA010.
CH070	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Shoal Bay	Near the boat ramp, Shoal Bay Road	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed as a stand-alone option** - to consider options as part of holistic adaptation strategy for the locality (refer Option CH073).
CH071	CH Threat 3	Y	Y		Y	Y	Coordinate with sand mining companies to enable their activities to manage the risk of aeolian sand transport.	Coastal Erosion Protection - Works	Open Coast		Medium	High	**Unknown**	**No**	**No**	**Do not proceed** - not feasible from engineering or approvals perspective.
CH072	CH Threats 1 and 2	Y	Y	Y	Y	Y	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	Coastal Erosion Protection - Works	Inner Port Outer Port		Medium	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH073	All CH Threats	Y			Y	Y	Develop a climate change adaptation strategy for the Shoal Bay precinct.	Coastal Hazard Protection - Policy	Shoal Bay		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH074	RA Threat 2	Y	Y	Y	Y	Y	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Coastal Hazard Protection - Policy	All		Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
CH075	CH Threat 7	Y	Y		Y	Y	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	Coastal Inundation Protection - Works	All		High	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**

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CH076	CH Threat 1	Y	Y		Y	Y	Oyster reef to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High	**Unknown**	**Yes**	**Yes**	**Do not proceed** - there is no erosion hazard mapping for this location to enable quantification of the risk to built assets and timeframe within which they would be impacted in the future. It not clear that coastal protection works are required as there is space to accommodate cycles of erosion and accretion within public land, albeit with a loss of trees (noting also an adaptation strategy is proposed for the Tilligerry Peninsula, Option CH005). Further, in some locations there may be private beneficiaries, and the option would therefore require a detailed economic assessment to comply with the requirements of the CM Act and CM Manual. Hence, a coastal erosion hazard assessment (option CH072) should be completed before it could be considered. Consider in next CMP (2035-2045).
CH077	CH Threat 1		Y		Y	Y	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	Coastal Erosion Protection - Works	All		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH078	CH Threat 1	Y			Y	Y	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	Coastal Erosion Protection - Works	Swan Bay	Approx. 340 m of seawall adjacent to Waterfront Road.	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH079	CH Threat 3	Y			Y	Y	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	Dune Transgression - Works	Birubi Point		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH080	CH Threat 1	Y			Y	Y	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	Coastal Erosion Protection - Works	Nelson Bay	Nelson Bay Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH081	CH Threat 4		Y		Y	Y	Install tide gates/flaps on priority stormwater outlets.	Coastal Inundation Protection - Works	All		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH082	All CH Threats	Y			Y	Y	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	Coastal Hazard Protection - Policy	National Parks & Nature Reserves		High	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
CH083	CH Threat 5				Y	Y	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	Coastal Inundation Protection - Works	All		Low	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**

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DI001	ME Threat 1	Y	Y	Y	Y	Y	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	Governance	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E001	BD Threat 2	Y	Y	Y	Y	Y	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.	Biodiversity Conservation	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E002	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Biodiversity Conservation	One Mile Beach		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
E003	BD Threat 2	Y	Y	Y	Y	Y	Develop and implement a community education program about biosecurity risks and the management of pests and weeds on private land.	Community Engagement	All		High	High	**Yes**	**Yes**	**NA**	**Do not proceed as stand-alone option** - Incorporated into option RA001
E004	BD Threat 2	Y	Y		Y	Y	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	Biodiversity Conservation	Mambo Wetlands		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E005	BD Threat 2	Y		Y	Y	Y	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.	Biodiversity Conservation	Soldiers Point		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E006	BD Threat 1	Y	Y		Y	Y	Work with community members to progress the integration of Mambo Wetlands into the Myall Lakes RAMSAR Site No. 994, or alternatively establish it as a new RAMSAR wetland.	Biodiversity Conservation	Mambo Wetlands		High	High	**Yes**	**Yes**	**Yes**	**Do not include in CMP** - Currently being progressed within Council, decision expected late-2023.

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E007	CH Threat 5	Y	Y		Y	Y	Undertake a water balance study for Mambo Wetlands to understand the wetland hydrology, to include consideration of climate extremes (e.g. droughts) and the potential impacts of climate change and sea level rise on the wetlands. The study should also consider the likely wetland hydrology prior to the development of any hydraulic controls at the interface with the estuary (e.g. construction of Foreshore Drive) and changes that may have arisen since the replacement of the culverts with a bridge following the March 2021 storm event.	Biodiversity Conservation	Mambo Wetlands		Low	Extreme	**Yes**	**Yes**	**NA**	**Do not proceed as stand-alone option** - Incorporated into option CH029.
E008	BD Threat 1	Y	Y		Y	Y	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	Biodiversity Conservation	Mambo Wetlands		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E009	BD Threat 2	Y			Y	Y	Re-plant locally endemic species to replace dying and falling old banksia trees in the Boat Harbour.	Biodiversity Conservation	Boat Harbour	Boat Harbour Beach, Boat Harbour Peninsula	High	High	**No**	**Yes**	**NA**	**Do not proceed -** To be progressed under existing Council activities.
E010	LC Threat 1	Y	Y		Y	Y	Clean up the dumped building materials along Tilligerry Creek.	Water Quality - Works	Lemon Tree Passage		High	High	**Yes**	**Yes**	**Yes**	**Same as Option CH076. Do not proceed as a stand-alone option** - there would be benefit waiting until erosion hazard mapping is available to under the level of risk. May potentially be considered as part of holistic adaptation strategy for this locality (refer Option CH005).
E011	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Biodiversity Conservation	Fingal Bay		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
E012	RA Threat 2	Y	Y	Y	Y	Y	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Public Access & Recreational Amenity	All		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
E013	RA Threat 2	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	Aboriginal Heritage	Open Coast	Stockton Beach	Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E014	WQ Threat 1	Y	Y		Y	Y	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	Biodiversity Conservation	All	Port Stephens-Great Lakes Marine Park	Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E015	RA Threat 2	Y			Y	Y	Undertake an audit of formal and informal beach access ways on land under the care and control of Council and identify beach accesses that can be rationalised and any associated dune or shoreline rehabilitation works, or other works to prevent informal beach access at these locations.	Biodiversity Conservation	All		Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Issue to be addressed through location specific options and under option E012**.**

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E016	RA Threat 2	Y			Y	Y	Encourage local volunteer groups to support dune rehabilitation activities.	Biodiversity Conservation	All	Council managed land	Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E017	RA Threat 2	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	Biodiversity Conservation	All	Council managed land	Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E018	BD Threat 2	Y			Y	Y	Prepare a new, updated Plan of Management for Mambo Wetlands.	Biodiversity Conservation		Mambo Wetlands	High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
E019	BD Threat 2	Y			Y	Y	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	Biodiversity Conservation		National Parks & Nature Reserves	High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
HE001	RA Threat 2	Y	Y	Y	Y	Y	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Aboriginal Heritage	All		Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
HE002	BD Threat 2	Y		Y	Y	Y	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	Aboriginal Cultural Management	Soldiers Point		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
RA001	RA Threat 2	Y	Y	Y	Y	Y	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Coastal Hazard Protection - Policy	All		Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
RA002	RA Threat 1	Y			Y	Y	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Public Access & Recreational Amenity	All		Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
RA003	RA Threat 2	Y			Y	Y	Develop a governance framework for coastal protection structures of unknown management status.	Governance	All	Inner Port Outer Port	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA004	RA Threat 2	Y			Y	Y	Re-classify 109 Foreshore Drive from operational to community land commensurate with its historic designation as a reserve.	Public Access & Recreational Amenity	Salamander Bay		NA	NA	-	-	-	**Already completed**
RA005	RA Threat 2	Y			Y	Y	Address safety risk associated with roots and other debris in the intertidal zone by providing warning signage.	Public Access & Recreational Amenity	Kangaroo Point		Medium	High	**No**	**Yes**	**Yes**	**Do not proceed** - does not address a risk**.**
RA010	CH Threat 2	Y			Y	Y	Beach nourishment for improved beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - although there is no available coastal erosion hazard mapping for the beach, it is considered that a short-term option such as beach nourishment could be an appropriate interim strategy while an adaptation strategy is prepared for the locality (refer Option CH073).

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
RA011	CH Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - given the short-term nature of this option and the fact that such works are likely to only have public beneficiaries (Crown lands, Shoal Bay Road), it is considered the works are primarily for improved recreational amenity and access.
RA012	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Shoal Bay	Shoal Bay Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA013	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Nelson Bay	Western end of Nelson Bay Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA034.
RA014	CH Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Nelson Bay	Western end of Nelson Bay Beach	Medium	Extreme	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option E012.
RA015	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Sandy Point	Conroy Park	Medium	High	**Yes**	**Yes**	**No**	**Remove as stand-alone option** - Incorporated into option RA017.
RA016	CH Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Sandy Point	Western side of Sandy Point	Medium	Extreme	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - given the short-term nature of this option and the fact that such works are likely to only have public beneficiaries, it is considered the works are primarily for improved recreational amenity and access.
RA017	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA018	CH Threat 1	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA016.
RA019	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Corlette	Around 130 m of shoreline near Danalene Parade	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA020	CH Threat 1	Y			Y	Y	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Tanilba	Mallabula Beach west of boat ramp	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - Review of vegetation condition at this site has identified that public access does not appear to be an issue at this time. However, the option could be continued as a landscaping and bank stabilisation option.

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
RA021	RA Threat 2	Y		P	Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Soldiers Point	Shoreline east of Soldiers Point Road, south of jetty	Medium	High	**Yes**	**Yes**	**No**	**Do not proceed** - Not feasible, insufficient space.
RA022	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Near Peace Parade	Medium	High	**No**	**Yes**	**Yes**	**Do not proceed** - on review of the conditions at the site, it is considered that there are no access issues and the existing seawalls are adequately protecting the area.
RA023	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Henderson Park west of the creek and incl. Kooindah Park	Medium	High	**Yes**	**Yes**	**Yes**	**Do not proceed** - it is considered that there are no access issues and note there is a shared path through the park. Refer also to option RA043.
RA024	RA Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Public Access & Recreational Amenity	Nelson Bay	Little Beach boat ramp / Nelson Bay Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option E012.
RA025	RA Threat 2	Y			Y	Y	Access management & dune rehabilitation.	Public Access & Recreational Amenity	Shoal Bay	Western 1km of Shoal Bay Beach, west of Shoal Bay Road	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA012.
RA026	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Salamander Bay	Roy Wood Reserve	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA027.
RA027	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Salamander Bay	Roy Wood Reserve	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA028	RA Threat 2	Y	P		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Salamander Bay	Foreshore Drive	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA027.
RA029	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Corlette	Conroy Park	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA017.
RA030	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Dutchmans Beach	Western end of Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA031	CH Threat 1	Y			Y	Y	Repair or replace stairs and fix fencing to reinstate public access from the car park.	Public Access & Recreational Amenity	Dutchmans Beach	Western end of Beach	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA032	RA Threat 2	Y			Y	Y	Access management & dune rehabilitation.	Public Access & Recreational Amenity	Dutchmans Beach		Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA030.
RA033	CH Threat 1	Y			Y	Y	Sand management to improve beach access and amenity.	Public Access & Recreational Amenity	Dutchmans Beach		Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option E012.

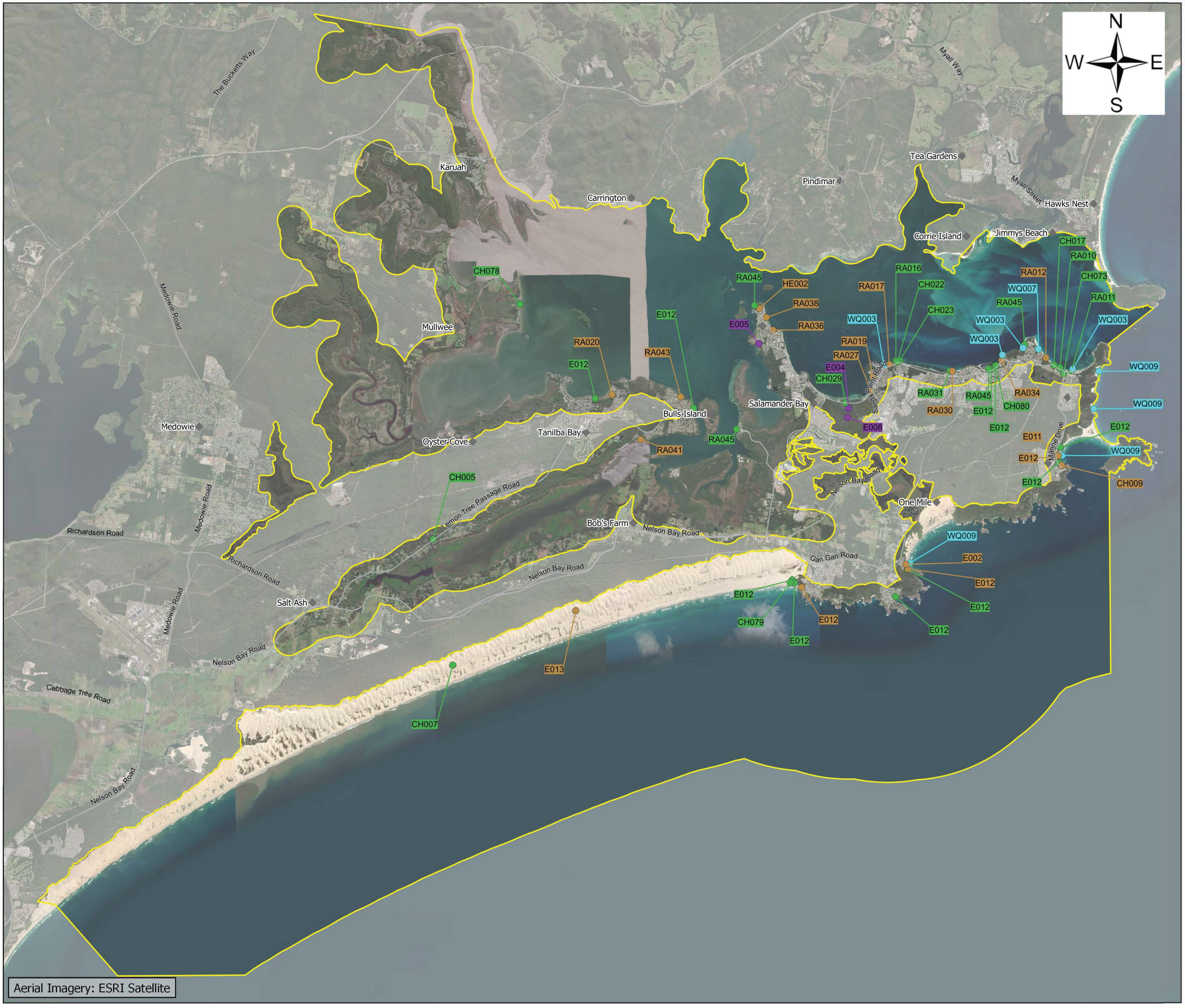
Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
RA034	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Public Access & Recreational Amenity	Nelson Bay		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA035	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Soldiers Point	Cook Street/Foreshore Drive	Medium	High	**Yes**	**Yes**	**No**	**Do not proceed** - Not feasible, insufficient space. See also RA021.
RA036	RA Threat 2	Y			Y	Y	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	Public Access & Recreational Amenity	Kangaroo Point		Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - the intent of the works is to improve public access and recreational amenity at the site, as per resident requests. Further, the benefits in terms of erosion mitigation are likely to be short to medium-term due to the nature of the works.
RA037	RA Threat 2	Y			Y	Y	Minor shoreline re-profiling and landscaping works.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High	**Yes**	**Yes**	**No**	**Do not proceed** - Not feasible, insufficient space. See also RA021.
RA038	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Coastal Erosion Protection - Works	Soldiers Point	North of Kangaroo Point	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA039	RA Threat 2	Y			Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Tanilba Bay West	Medium	High	**Yes**	**Yes**	**Yes**	**Do not proceed** - on review of the site conditions it is considered that the vegetation is in good condition at this location and there are no access issues at present. Further, there may be insufficient space to implement such works within the available public land.
RA040	RA Threat 2	Y	P		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Tanilba	Sunset Park	Medium	High	**Yes**	**Yes**	**Yes**	**Do not proceed** - due to the presence of rock at this location is it considered that access management for erosion mitigation is not required. The maintenance of vegetation can be managed by Council's volunteers under Option E016.
RA041	RA Threat 2	Y	Y		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**
RA042	RA Threat 2	Y	Y		Y	Y	Access management & landscaping works.	Public Access & Recreational Amenity	Lemon Tree Passage	Lemon Tree Passage Park between Shore Drive and John Parade	Medium	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA041.
RA043	RA Threat 2	Y			Y	Y	Undertake fencing and landscaping works to stabilise the foreshore .	Public Access & Recreational Amenity	Lemon Tree Passage	Henderson Park (west of the	Medium	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment**

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
										creek) and Kooindah Park						
RA044	BD Threat 1	Y			Y	Y	Dune rehabilitation for biodiversity conservation and to provide coastal protection.	Biodiversity Conservation	Shoal Bay	Near the boat ramp, Shoal Bay Road	High	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA012.
RA045	CH Threat 7	Y			Y	Y	Dredging to improve access to the boat ramp and Soldiers Point marina.	Public Access & Recreational Amenity	Soldiers Point	Boat ramp and marina	High	High	**Yes**	**Yes**	**Yes**	**Progress to viability assessment** - incorporate other dredging activities into the same option.
RA046	CH Threat 7	Y			Y	Y	Undertake dredging to remove accumulated sediment in Nelson Bay marina and place on adjacent beach.	Recreational Amenity	Nelson Bay	Nelson Bay Marina	High	High	**Yes**	**Yes**	**Yes**	**Remove as stand-alone option** - Incorporated into option RA045.
WQ001	All WQ Threats	Y	Y		Y	Y	Develop a water quality monitoring program for Port Stephens.	Monitoring & Evaluation	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
WQ002	All WQ Threats	Y	Y		Y	Y	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	Monitoring & Evaluation	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
WQ003	All WQ Threats	Y	Y		Y	Y	Implement the Port Stephens Water Quality Monitoring Program and undertake annual reporting.	Monitoring & Evaluation	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
WQ004	BD Threat 1					Y	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Water Quality - Policy	All		High	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
WQ005	WQ Threat 1	Y	Y		Y	Y	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	Community Engagement	All		Medium	High	**Yes**	**Yes**	**NA**	**Progress to viability assessment**
WQ006	WQ Threat 4	Y	Y		Y	Y	In order to manage the potential/existing impacts on Port Stephens, support the development of Landfill Aftercare Management and Rehabilitation Works Plans for the de-commissioned waste facilities at Salamander Bay and Lemon Tree Passage, as proposed under Council's Waste Management Strategy 2021-2031.	Water Quality - Works	Salamander Bay Lemon Tree Passage		Medium	High	**Yes**	**No**	**Yes**	**Do not proceed** - Although this option would be beneficial for water quality, the landfills that are the subject of this option are located outside the study area and are therefore not able to be considered in the CMP. Nonetheless, it is noted that the Landfill Aftercare Management and Rehabilitation Works Plans are already being implemented by Council.

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option	Category of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Reduces Risk	Statutory / Policy Compliance	Engineering Feasibility	Outcome of Feasibility Assessment?
WQ007	WQ Threat 4	Y			Y	Y	Provide an alternate (back up) energy supply for sewerage plant at Shoal Bay to minimise the risk of sewage overflows during loss of electricity supply via the grid.	Water Quality - Works	Shoal Bay		Medium	High	Yes	Yes	NA	Progress to viability assessment
WQ008	WQ Threat 1	Y			Y	Y	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Water Quality - Policy	All		Medium	High	Yes	Yes	NA	Progress to viability assessment
WQ009	All WQ Threats						Beachwatch monitoring program for recreational water quality at ocean beaches (continued program)	Water Quality - Works	Box Beach Fingal Beach One Mile Beach Zenith Beach		High	High	Yes	Yes	NA	Progress to viability assessment
WQ010	WQ Threat 5	Y			Y	Y	Install tangle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters.	Biodiversity Conservation	All		High	High	Yes	Yes	Yes	Progress to viability assessment
WQ011	WQ Threat 5	Y			Y	Y	Develop targeted education program and materials to reduce recreational fishing waste impacts on Port Stephens.	Community Engagement	All		High	High	Yes	Yes	NA	Remove as stand-alone option - Combined with option WQ010.

Appendix F

Viability Assessment Outcomes



PORT STEPHENS COUNCIL

RG-00-14

Port Stephens Coastal Management Program

Options Progressed to Viability Assessment

Legend

- Study Area

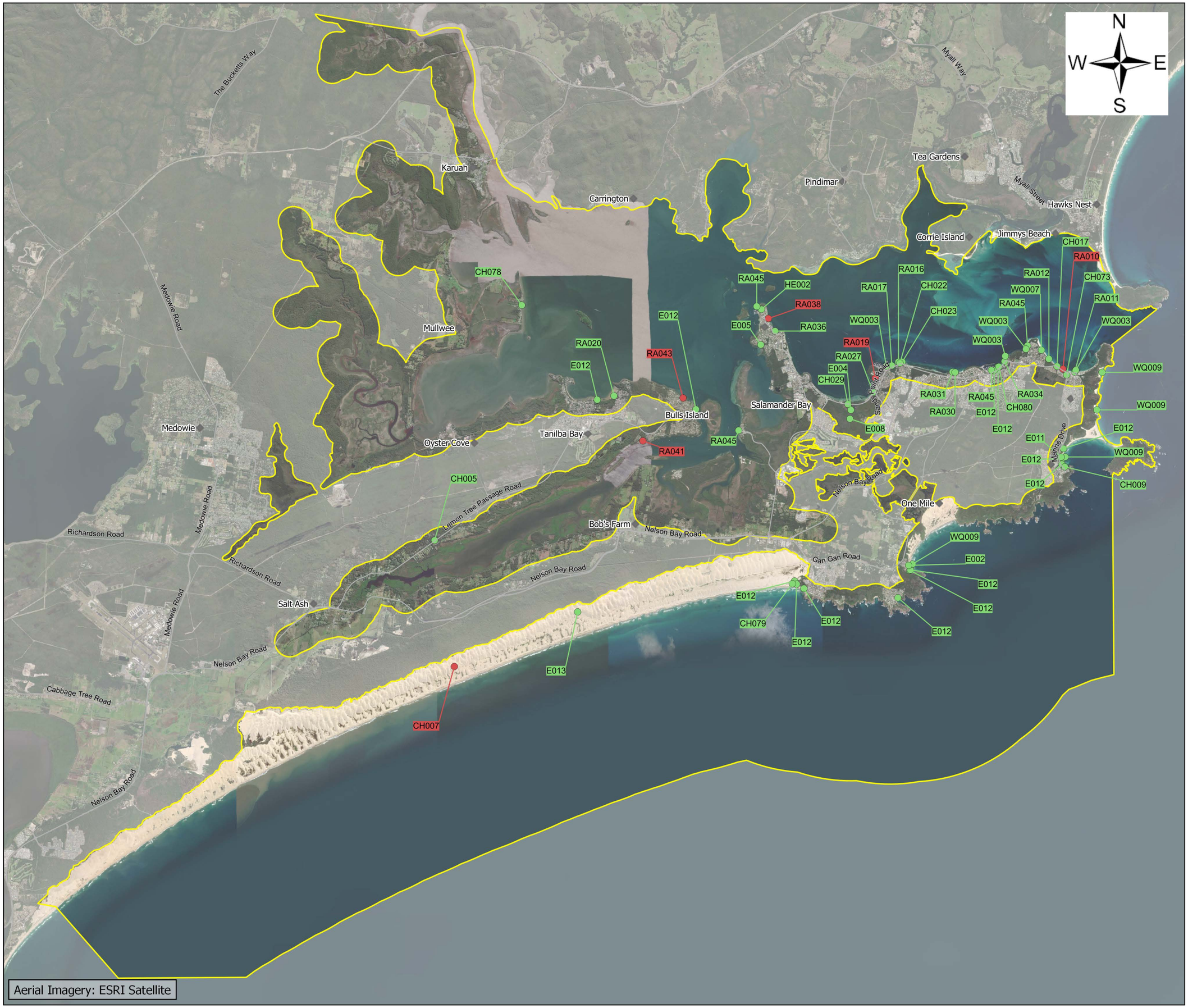
Coastal Threat Category

- Biodiversity Threat
- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

0 1 2 3 km

Job Number: J1702
Scale : 1:115000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm



PORT STEPHENS COUNCIL

RG-00-15

Port Stephens Coastal Management Program

Viable Options Recommended for the CMP

Legend

- Study Area

Recommended for CMP

- Include in CMP
- Exclude from CMP

0 1 2 3 km

Job Number: J1702
Scale : 1:115000@A3
Date : 21/02/2024
Revision : 03
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	CH Threat 1	CH Threat 2	CH Threat 3	CH Threat 4	CH Threat 5	CH Threat 6	CH Threat 7	WQ Threat 1	WQ Threat 2	WQ Threat 3	WQ Threat 4	WQ Threat 5	BD Threat 1	BD Threat 2	LC Threat 1	ME Threat 1	RA Threat 1	RA Threat 2	Collaboration	Biodiversity & Ecosystem Integrity	Climate Change	Land Use Planning	Aboriginal Custodianship	Coastal Economies	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
CH001	All CH Threats	Coastal hazard monitoring strategy.	There is opportunity to build knowledge on the impact of coastal hazards on Port Stephens including long-term climate change. Monitoring will also inform adaptive management as identified in this CMP. The monitoring should consider: • measuring the impacts of climate change, • improving understanding of coastal processes and the impacts of events on the coastal zone, • tracking change or identifying trends, and • identifying if triggers for adaptive management have been reached for relevant management actions. This option is linked to option CH009, which proposes an additional CoastSnap monitoring station as part of Council's existing suite of CoastSnap locations. The CoastSnap data and analyses should form part of the monitoring program.	Alert	All	PSC	DCCEEW - EHG	$15,000	Year 1 and ongoing	$67,000	$685,000	3	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	0	0	4	6	2	2	4	14	5	14	26	Yes	Yes	Required for appropriate risk management for land use planning, asset management and other future planning. Critical knowledge building activity.
CH002	All CH Threats	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	This action will provide for the ongoing monitoring of Council's coastal structures as part of their asset management system. The monitoring framework will in the first instance require a survey to establish the baseline condition of existing structures, building on the survey undertaken for Stage 2, the BMT (2021b) Coastal Structures Audit. The outcomes of the monitoring could be used to inform any remedial or maintenance works required for the structures.	Alert	All	PSC	NA	$0	Year 1 and ongoing	$24,000	$240,000	3	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	3	1	2	3	9	3	37	47	Yes	Yes	This activity is a critical asset management activity, to understand which structures require maintenance or may in future require an upgrade.
CH003	All CH Threats	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	A similar study is currently underway for the Worimi Conservation Lands and this study proposes to evaluate risk to sites located on Council land and Crown land managed by Council.	Planning for change	All	PSC	NA	$175,000	Year 4	$0	$175,000	3	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	0	2	0	4	7	2	2	4	15	5	9	26	Yes	Yes	
CH005	CH Threat 5	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Large areas of land along the Tilligerry Peninsula are subject to coastal inundation in the present day, a risk that will increase in future. In addition, the low-lying land of the peninsula is also at risk from permanent tidal inundation. This has implications for the overarching approach for managing risk from all coastal and flood hazards.	Planning for change	All	PSC	DCCEEW - EHG, Utilities (e.g. HWC), TfNSW, NPWS, DPHI - Crown Lands, Worimi LALC	$200,000	Year 6-7	$0	$200,000	3	1	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	2	0	0	3	7	1	1	2	12	4	19	36	Yes	Yes	Necessary Strategy for future planning and adaptation to climate change.
CH007	CH Threat 3	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Dune transgression was identified as a key threat to natural, cultural and built assets along Stockton Beach. Dune management for coastal hazard protection.	Active intervention	Stockton Sand Dunes	PSC	WCLB	$510,000	Year 2	$102,000	$1,326,000	4	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	1	2	6	2	2	4	12	3	19	47	Yes	Yes	Requires confirmation by WCLB prior to inclusion in CMP.
CH009	CH Threat 2	Install additional Coast Snap monitoring point at Fingal Beach.	Coast Snap monitoring points provide valuable data about shoreline changes over time. There are already official CoastSnap points at Shoal Bay, Nelson Bay and Birubi Point.	Active intervention	Fingal Bay	PSC	DCCEEW - EHG	$11,800	Year 2	$7,000	$74,800	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	2	2	4	9	2	2	4	17	9	3	11	Yes	Yes	This would be a useful addition to the CoastSnap network in Port Stephens to assist with management of this popular beach.
CH011	All CH Threats	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	To provide mitigation of risk to life and property arising from coastal hazards for existing and proposed development.	Planning for change	All	PSC	NA	$0	Year 1	$0	$0	1	2	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0	2	4	7	1	2	3	14	14	14	4	Yes	Yes	Required for future land use planning.
CH012	CH Threats 4 and 5	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from	The coastal hazard study identified that several local roads are inundated in the present day due to coastal inundation.	Planning for change	All	PSC	TfNSW	$200,000	Year 1 to 3	$0	$200,000	3	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	1	0	1	2	3	2	2	4	9	3	37	47	Yes	Yes	Necessary to address future risk to roads. Links to some of the

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		tidal inundation aimed at the ongoing provision of access for the community in future.	Some of these roads provide the only emergency access and egress to parts of the LGA.																																												adaptation plans (CH005, CH029, CH073).
CH017	CH Threat 1	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Shoal Bay Road is the sole access for Shoal Bay and Fingal Bay. The section of the road east of Beach Road is close to the shoreline. In the absence of erosion hazard lines for the Outer Port, the extent and timing of coastal erosion risk to the road is unknown. This option proposes a coastal erosion risk assessment and, if required, an assessment of feasible options to protect the road.	Planning for change	Shoal Bay	PSC	NA	$200,000	Year 2 to 3	$0	$200,000	3	2	2	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	-1	1	1	-1	0	1	0	2	2	4	5	2	57	56	No	Yes	Concerns around future risk to this road based on previous experience of emergency works in the past. Critical road to the Tomaree area. To be undertaken concurrently with the adaptation plan (CH073).
CH022	CH Threat 1	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	At present the absence of erosion hazard mapping in the Outer Port precludes a distribution analysis to allocate costs to public and private beneficiaries of coastal protection works. This option proposes progressing previously identified options for Sandy Point so that they can be progressed promptly to implementation through the economic analyses and grant application process for co-funding by the State, PSC and benefitting individuals.	Active intervention	Sandy Point	PSC	DPHI - Crown Lands	$285,000	Year 6-7	$0	$285,000	3	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	1	0	0	0	2	1	1	0	1	4	1	62	66	No	Yes	Critical to address the ongoing issues within this area. This enables Council to have a 'shovel ready' option for when the next CMP is prepared to enable prompt implementation (pending a CBA and acceptance of proposed funding with identified beneficiaries).
CH023	CH Threat 1	Undertake maintenance works / repairs to the existing rock revetment.	An audit of coastal structures undertaken by BMT (2021) concluded the existing foreshore protection measures at Sandy Point require significant repairs and modifications to achieve functionality. This option proposes maintenance works in the form of toe protection works to improve the functionality of the existing structure on the eastern shoreline of Sandy Point. It is noted the structure is an abandoned asset.	Active intervention	Sandy Point	PSC	DPHI - Crown Lands	$1,156,500	Year 2	$16,500	$1,305,000	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	1	3	1	66	66	No	Yes	Critical to the protection of this area. Ongoing issues within this area due to historical protection works. Maintenance of existing rock revetment.
CH029	CH Threat 5	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Following a recent coastal storm that damaged the road, Foreshore Drive was closed until such time as Council constructed a new bridge. It is apparent the risk to natural and built assets at this location will increase under climate change conditions. The protection of Mambo wetlands is an important issue for the community and needs special consideration, to include a water balance and hydrological study.	Planning for change	Salamander Bay	PSC	NA	$200,000	Year 5 to 6	$0	$200,000	3	2	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	1	0	3	9	2	2	4	16	5	6	26	Yes	Yes	Critical to address future risk from climate change and how the community and Council will adapt.
CH072	CH Threats 1 and 2	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	The erosion hazard mapping prepared in Stage 2 of the CMP only covered the open coast. The lack of erosion hazard mapping in the Inner and Outer Port means that there is a lack of information about the potential risk from shoreline erosion and how the risk will change over time. The lack of erosion hazard lines also means that it is not possible to undertake distribution analyses to identify beneficiaries of coastal protection works in the Inner and Outer Port and therefore any such works would not be eligible for funding under the C&E Grants program. It is noted that this would result in the need to review the adequacy of the new provisions of the LEP and DCP relating to coastal hazards developed under management action CH011 and updates to these provisions may be required at that time. The coastal risk planning mapping would also require updating to incorporate the new hazard extents.	Alert	Inner Port Outer Port	PSC	DCCEEW - EHG	$350,000	Year 1 to 2	$0	$350,000	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	1	2	2	10	2	2	4	16	5	6	26	Yes	Yes	This is a critical activity to enable future planning and support future CMPs.

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CH073	All CH Threats	Develop a climate change adaptation strategy for the Shoal Bay precinct.	The adaptation plan should aim to develop a more detailed understanding of the existing and future risk from coastal hazards to natural and built assets and infrastructure in Shoal Bay which can then be discussed with the stakeholders with respect to the key attributes and activities undertaken in Shoal Bay that the community would like to maintain into the future and under climate change conditions. One key issue that has been identified to date is the risk to Shoal Bay Road from coastal hazards - it is the only road servicing this locality. The output of the plan will be an agreed and costed adaptation pathway.	Planning for change	Shoal Bay	PSC	DCCEEW - EHG, Utilities (e.g. HWC), NPWS, DPHI - Crown Lands	$200,000	Year 2-3	$0	$200,000	3	2	2	0	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	1	2	4	11	2	2	4	19	6	2	20	Yes	Yes	Critical to future planning of the area, which is highly valued area for community and tourists. Implement concurrently with Option CH017.
CH074	RA Threat 2	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Some owners of foreshore properties are of the understanding that Council will be wholly responsible for the protection of foreshore land from coastal hazards. Consistent with the State Government policy, Council wishes to make clear that their priority is the protection of public land and assets. Further, the community members have identified that equity and prioritisation of public benefit is important to them. In addition, there is an expectation that Council will maintain existing works, whether or not they are owned by Council. Council wishes to clarify that they are only responsible for maintenance of seawalls for which they are the identified owner or responsible party (e.g. under a Crown lands licence).	Planning for change	All	PSC	NA	$25,000	Year 2	$0	$25,000	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2	1	2	2	7	1	2	3	12	6	19	20	Yes	Yes	Council lack an existing policy. Hence, the option is necessary to address the community's expectations and clearly communicate Council's position.
CH075	CH Threat 7	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	It is recommended that a catchment balance assessment be undertaken to ensure the balance between catchment flows and tidal inundation risk is considered. The works would then be prioritised on a risk basis considering adjacent land use, history of issues/complaints and the potential reductions in economic damages arising from alleviation of the associated nuisance flooding.	Active intervention	All	PSC	NA	$175,000	Year 3	$0	$175,000	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	3	1	2	3	7	2	47	56	Yes	Yes	
CH077	CH Threat 1	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	This action has been included to assist Council in undertaking the preparatory activities required to facilitate implementation of the CZEAS, if triggered. It is assumed that these approvals, permits and licences would be in place for a maximum of five years, and therefore would require re-application or renewal during the 10 year period of implementation.	Emergency response	All	PSC	NA	$50,000	Year 1 and Year 6	$0	$100,000	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2	2	2	4	7	4	47	36	Yes	Yes	
CH078	CH Threat 1	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	This action applies to part of the Swan Bay seawall that is failing and requires toe protection works to ensure its ongoing functionality. In addition to the coastal inundation risk at this location, the structure is retaining land that is filled with building waste. A clean out of the stormwater outlet is also required. The seawall is adjacent to Waterfront Road, which is a Crown Road managed by Council.	Active intervention	Swan Bay	PSC	DPHI - Crown Lands	$304,000	Year 3	$15,000	$409,000	3	2	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2	**1**	**0**	1	5	2	57	56	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
CH079	CH Threat 3	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	The aeolian transport of sand into the car park and other facilities at Birubi Point is an ongoing issue. This action proposes to undertake dune stabilisation works to facilitate the accretion and capture of sand, including barrier dune reformation, fencing and revegetation.	Active intervention	Birubi Point	PSC	NA	$100,000	Year 2	$20,000	$260,000	3	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2	2	4	**2**	**2**	4	10	3	32	47	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
CH080	CH Threat 1	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	This action is proposing design and investigation of a permanent solution to the ongoing coastal erosion issue at this location.	Active intervention	Nelson Bay Beach	PSC	DPHI - Crown Lands	$87,000	Year 1	$0	$87,000	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	-1	1	2	0	**1**	**1**	2	4	2	62	56	No	Yes	Council requested addition of this option to address ongoing erosion issues in this location.

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CH081	CH Threat 4	Install tide gates/flaps on priority stormwater outlets.	This option provides for implementation of priority works identified under option CH075 at up to 20 sites.	Active intervention	All	PSC	NA	$135,000	Year 4 and ongoing	$60,000	$435,000	3	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2	1	1	2	6	2	51	56	Yes	Yes	
CH082	All CH Threats	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	NPWS periodically updates their PoMs for National Parks, Nature Reserves and other National Park Estate lands.	Planning for change	National Parks & Nature Reserves	NPWS	NA	$0	As required	$0	$0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	2	2	0	2	2	4	9	2	2	4	17	17	3	1		Yes	
CH083	CH Threat 5	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	There are a number of Council owned buildings that are exposed to risk from coastal inundation in the event of a coastal storm such as an East Coast Low. It is recommended that these facilities have a plan in place to mitigate the impacts of inundation and manage the safety risk to occupants at the time of such an event.	Emergency response	All	PSC	NA	$0	Year 1	$0	$0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	2	4	7	7	47	17		Yes	
DI001	ME Threat 1	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	On 12 July 2023 the Federal Minister for the Climate Change and Energy declared the Hunter Offshore Renewable Area, extending offshore from Norah Head in the South to Port Stephens in the north. Being offshore of the study area for this CMP, there is potential for the infrastructure to pass through the study area. This option proposes a Memorandum of Understanding between Council and the WCLB (which includes Native Title claimants for the relevant State waters) to share information and work together to ensure sustainable coastal and offshore development.	Avoid future impact	All	PSC	WCLB	$0	Year 1 to 5	$5,000	$25,000	2	0	0	0	0	0	0	1	1	0	0	0	1	0	0	2	0	0	2	1	1	2	1	1	4	8	1	1	2	14	7	14	17	Yes	Yes	This option is appropriate in the context of ongoing support and partnership between Council and the WCLB to management of coastal land.
E001	BD Threat 2	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.	These plans have been developed by Hunter LLS and provide for coordinated pest and weed control by the relevant stakeholders. Biosecurity was identified as a key threat to coastal biodiversity.	Active intervention	All	PSC	NA	$0	Year 1 and ongoing	$25,000	$250,000	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	2	2	6	2	2	4	12	4	19	36	Yes	Yes	
E002	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Informal access through the dunes is negatively impacting vegetation and the dune system in several locations along the beach. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	One Mile Beach	PSC	NA	$197,000	Year 3 and ongoing	$8,750	$258,250	3	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	2	2	1	3	6	1	1	2	11	4	28	36	Yes	Yes	There are ongoing issues at this location that need action as a priority. The key area is around the SLSC. There is risk to the road from dune movement.
E004	BD Threat 2	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	The Mambo Wetlands comprises a large area of Coastal Wetland. This option supports the ongoing management of this important area. When the current PoM is updated as per management action E018 (and any findings or recommendations arising from actions E008 and CH029), this management action would support implementation of the updated PoM.	Active intervention	Mambo Wetlands	PSC	NA	$0	Year 1 and ongoing	$12,000	$120,000	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	1	0	2	4	2	2	4	10	3	32	47	Yes	Yes	
E005	BD Threat 2	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other	There is an area of Littoral Rainforest located at Soldiers Point.	Active intervention	Soldiers Point	PSC	NA	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	0	2	3	2	2	4	9	9	37	11	Yes	Yes	

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		works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.																																											
E008	BD Threat 1	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	The most recent survey was undertaken over 20 years ago. In addition, the recent replacement of the Foreshore Drive culverts with a bridge has altered the hydrological regime in the wetlands and is likely to have implications for wetland biodiversity.	Alert	Mambo Wetlands	PSC	NA	$75,000	Year 2	$0	$75,000	2	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	2	0	1	1	0	4	4	2	2	4	12	6	19	20	Yes	Yes	This an important wetland managed by Council and is highly values by the community.
E011	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Fingal Bay	PSC	NA	$197,000	Year 4	$8,750	$249,500	3	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	1	1	1	1	3	6	1	1	2	11	4	28	36	No	Yes	There are ongoing key issues at this location that require action as a stand-alone option.
E012	RA Threat 2	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Sand management is a key issue for the study area and requires ongoing management by Council. In some locations, aeolian transport of sand is significant and can inundate recreational areas, accessways and other assets. In other locations coastal sediment transport processes (e.g. littoral drift) can result in accretion of sand in some locations and/or erosion others. Sand carting or beach scraping may be required to address these issues. At the same time, foreshore vegetation, dunes and accessways are subject to coastal erosion, an issue that may be compounded by members of the public cutting across dunes to access the beach rather than using formal accessways, resulting in loss of vegetation and further erosion. This compromises the integrity of the dunes, which function to provide protection for landward assets and also have ecosystem value. Beach accessways can become unsafe at times due to erosion (e.g. undermining) and regularly require repairs or replacement. Hence there is a need for ongoing active management of public beaches and dunes.	Active intervention	All	PSC	NA	$25,000	Year 1 and ongoing	$140,000	$1,425,000	4	0	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	0	2	1	2	4	7	2	2	4	15	4	9	36	Yes	Yes	There is an ongoing requirement to undertake work to protect and enhance foreshore public lands managed by Council, as well as manage the risks to public safety and the environment.
E013	RA Threat 2	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	The current approach to managing these activities is not wholly effective and could benefit from increased compliance and enforcement to discourage inappropriate activities.	Active intervention	Open Coast	NPWS, WCLB	NA	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	2	1	0	1	2	0	3	6	1	2	3	12	12	19	6	Yes	Yes	
E014	WQ Threat 1	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	There are a number of activities listed in the forthcoming Plan that identify Council as an implementation partner.	Active intervention	All	PSC	DPI - Marine Parks	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	1	1	2	1	0	0	0	1	5	4	1	2	3	12	12	19	6	Yes	Yes	
E016	RA Threat 2	Encourage local volunteer groups to support dune rehabilitation activities.	Provide direction, funding and support for community involvement in dune rehabilitation projects along the coast. Coordination of volunteers is by the Strategy and Environment team, but would be delivered by the Public Domain and Services team.	Active intervention	All	PSC	NA	$0	Year 1 and ongoing	$5,000	$50,000	2	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	2	0	0	0	0	2	3	2	2	4	9	5	37	26	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.
E017	RA Threat 2	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	This option was added as a result of changes to Action E013, noting that Council had no jurisdiction on National Park or Worimi Conservation lands. However, Action E013 can be complemented by ongoing regulation of these activities by Council where they do have jurisdiction.	Active intervention	All	PSC	NA	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	2	1	0	1	2	0	3	6	1	2	3	12	12	19	6	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune

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																																															rehabilitation and foreshore restoration.
E018	BD Threat 2	Prepare a new, updated Plan of Management for Mambo Wetlands.	The current PoM for Mambo Wetlands was prepared in 2006 and could benefit from an update to better reflect the changes in the statutory environment and catchment land use, as well as the current condition, threats and pressures affecting the wetland. The new PoM should reflect the outcomes of related management actions E008 (Ecological survey of Mambo Wetlands) and CH029 (Adaptation Plan for Foreshore Drive locality).	Active intervention	Mambo Wetlands	PSC	NA	$100,000	Year 3	$0	$100,000	2	0	1	0	1	1	0	0	1	0	0	1	0	2	2	0	0	0	1	0	2	1	1	1	0	7	5	2	2	4	16	8	6	16	Yes	Yes	
E019	BD Threat 2	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	NPWS undertakes shorebird conservation and protection activities in accordance with approved Threatened Species Management Plans.	Active intervention	Mambo Wetlands	NPWS	NA	$0	Ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	1	2	2	0	1	0	3	6	1	2		9	9	37	11	Yes	Yes	
HE001	RA Threat 2	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Traditional Owners and Knowledge Holders play an important role in providing input on various projects and activities undertaken in the coastal zone by Council (and vice versa) and this function would benefit from formal acknowledgement and support.	Planning for change	National Parks & Nature Reserves	PSC	NA	$75,000	Year 1 to 2	$0	$75,000	2	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	0	1	2	0	4	5	2	2	4	13	7	17	17	Yes	Yes	
HE002	BD Threat 2	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	This important site benefits from a co-management approach.	Active intervention	Soldiers Point	PSC	NA	$15,000	Year 1 and ongoing	$15,000	$150,000	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	0	0	2	0	2	4	2	2	4	10	3	32	47	Yes	Yes	
RA001	RA Threat 2	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Private coastal protection and other works are contributing to key threats to the coastal zone, including encroachment on public land and environmental and heritage impacts.	Avoid future impact	All	PSC	DCCEEW - EHG	$25,000	Year 2	$0	$25,000	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	1	2	0	0	4	4	1	2	3	11	6	28	20	Yes	Yes	This is a necessary document requested by the community to provide support and guidance to owners of foreshore land.
RA002	RA Threat 1	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Fishing and boating are key recreational activities that support the coastal economy. Sufficient and appropriate infrastructure minimises user conflicts.	Active intervention	All	PSC	TfNSW - MIDO	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	2	0	2	3	4	2	2	4	11	11	28	9	Yes	Yes	Council has adopted the plan and will undertake implementation.
RA003	RA Threat 2	Develop a governance framework for coastal protection structures of unknown management status.	For many existing coastal structures the authority or person responsible for maintenance of the structure is not known and they are not maintained. Potential impacts of these structures on the environment and/or public safety and access may not be understood or managed appropriately. Liaise with Crown lands regarding the Marine Estate Management Strategy (MEMS) Breakwall governance and management project and agree to appropriate governance for foreshore structures ('breakwalls') in Port Stephens for which the party responsible for maintenance of the structure is not known.	Active intervention	All	PSC	DPHI - Crown Lands	$0	Year 2	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	2	1	2	3	6	6	51	20	Yes	Yes	There are a number of seawalls in the study area for which the tenure/owner is not known and/or the structure may not have been approved. There is a need to develop an approach to managing these existing structures as they be in poor condition, and may also be adversely impacting public safety and access and the environment.

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RA010	CH Threat 2	Beach nourishment for improved beach access and amenity.	The general westward trend of sand transport in Shoal Bay leads to a reduction in beach width and volume. This option proposes nourishment to increase beach volume for improved access and amenity for this popular beach. It provides a comparison with sand carting, which is Council's historic approach to managing this issue.	Active intervention	Shoal Bay	PSC	NA	$2,862,500	Year 2	$0	$2,862,500	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	2	0	2	0	4	1	1	2	6	2	51	56	No	No	Council has determined to not proceed with this option in the current CMP due to the high cost and uncertainty around the planning approvals.
RA011	CH Threat 2	Sand carting to provide improved beach access and amenity.	Council has historically undertaken sand carting to transfer accreted sand from the western end of the beach further east for improved beach width and volume for amenity reasons. While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Shoal Bay	PSC	NA	$295,000	Year 1 to 10	$0	$0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	2	0	5	2	2	4	9	9	37	11	No	Yes	This activity is critical to address an issue of public access and recreational amenity. The community highly values Shoal Bay Beach and it is also critical for tourism.
RA012	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Undertake works to control public access and revegetate the dune. A combination of high intensity public visitation and periodic erosion events has resulted in a need to repair or replace dune fencing, restrict access through eroded locations, and re-vegetate sections of the dune. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Shoal Bay	PSC	NA	$450,000	Year 1 and ongoing	$55,100	$945,900	3	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	2	1	2	1	2	4	8	2	1	3	15	5	9	26	Yes	Yes	This option is critical to address the existing erosion issues and to provide future protection, implemented in conjunction with sand carting. This area is highly valued by the community.
RA016	CH Threat 2	Sand carting to provide improved beach access and amenity.	Sand carting and beach nourishment activities have previously been undertaken at Conroy Park. The ongoing sand deficit at this location results in reduction in beach volume/width. This option has been developed based on Priority Action 1 from the Management Plan for Sandy Point/Conroy Park (Whitehead and Assoc, 2015). While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Sandy Point / Conroy Park	PSC	NA	$122,500	Year 3	$10,000	$192,500	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	-1	1	0	2	1	2	3	5	2	57	56	No	Yes	This option is critical to the use and protection of this area, which is highly valued by the community.
RA017	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location is affected by an ongoing sand deficit and would benefit from a more targeted action. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Corlette	PSC	NA	$16,500	Year 4	$5,250	$48,000	2	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	2	0	0	4	3	1	1	2	9	5	37	26	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.
RA019	RA Threat 2	Access management & landscaping works.	This option relates to around 130 m length of shoreline near Danalene Parade.	Active intervention	Corlette	PSC	NA	$3,250	Year 6	$228	$4,160	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	3	1	1	0	1	5	5	57	26	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment and there is some vegetation protecting the foreshore (including at the narrowest points). Further, based on relatively low intensity of usage

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																																															comparable with other locations in the coastal zone, this site is not considered a high priority site by Council.
RA020	CH Threat 1	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	The intent of this option is to undertake landscaping to assist in bank stabilisation. Where necessary some geotextile matting or coir logs may be placed to assist bank stabilisation. The extent of foreshore proposed for landscaping works is around 110 m long.	Active intervention	Tanilba	PSC	NA	$41,750	Year 6	$2,950	$53,550	2	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	3	1	1	1	2	6	3	51	47	Yes	Yes	
RA027	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Salamander Bay	PSC	NA	$50,000	Year 5	$3,500	$67,500	2	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	1	0	0	4	2	1	1	2	8	4	45	36	Yes	Yes	This location is highly valued by the community.
RA030	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Dutchmans Beach	PSC	NA	$52,500	Year 4	$3,675	$74,550	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	2	0	2	3	5	1	1	2	10	5	32	26	Yes	Yes	There are ongoing erosion issues at this location that require action. However, access is not a real issue and the effort should focus on erosion management.
RA031	CH Threat 1	Repair or replace stairs and fix fencing to reinstate public access from the car park.	There have been concerns raised by the community regarding the length of time these stairs have been closed. They were closed and barricaded following erosion sufficient to render the stairs inaccessible and a safety risk.	Active intervention	Dutchmans Beach	PSC	NA	$10,000	Year 1	$2,000	$28,000	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	4	2	2	4	8	4	45	36	Yes	Yes	This location is highly valued by the community.
RA034	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Nelson Bay Beach	PSC	NA	$114,000	Year 4	$7,000	$156,000	3	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	1	2	0	2	3	6	2	1	3	12	4	19	36	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.
RA036	RA Threat 2	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	The community is concerned about the ongoing erosion at this location. The proposed works would involve some minor re-profiling to create a shoreline profile similar to the nearby beach, with additional stabilisation provided by geotextile or jute meshing and coir logs, as required. Landscaping would be used to both stabilise the shoreline and control public access.	Active intervention	Kangaroo Point	PSC	NA	$233,000	Year 7	$21,875	$298,625	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	2	0	0	1	4	1	0	1	6	2	51	56	Yes	Yes	There is an existing study that examines the processes that are causing erosion at this location. There are Hunter Water assets in this location that also need protection
RA038	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 480 m.	Active intervention	Soldiers Point	PSC	NA	$24,000	Year 7	$1,680	$29,040	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	2	1	0	0	0	3	2	67	56	No	No	While there is opportunity to provide native vegetation for habitat value and dune stabilisation, the location is subject to lower intensity usage and has limited space available. It is not considered a high priority site by Council.
RA041	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 1,150 m.	Active intervention	Lemon Tree Passage	PSC	NA	$28,750	Year 6	$2,013	$36,800	2	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	3	1	0	0	0	4	2	62	56	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access

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																																																impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, and noting also the width of public land at this location to accommodate cycles of erosion and accretion, this site is not considered a high priority site by Council.
RA043	RA Threat 2	Undertake fencing and landscaping works to stabilise the foreshore .	The intent of the works would be to construct some fencing to control public access between the shoreline and the water and to implement landscaping works to facilitate bank stabilisation over a length of shoreline of about 550 m.	Active intervention	Lemon Tree Passage	PSC	NA	$13,750	Year 5	$963	$18,563	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	1	0	2	2	1	0	1	5	3	57	47	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, this site is not considered a high priority site by Council.
RA045	CH Threat 7	Dredging to improve access to the boat ramp and Soldiers Point marina.	Naturally occurring sediment transport processes can result in the accretion of sand in navigational areas, limiting access to boat ramps or marinas. This action provides for maintenance dredging to address this issue.	Active intervention	Little Beach, Nelson Bay, Soldiers Point, Taylors Beach	PSC	NA	$174,500	Year 1 and ongoing (as reuqired)	$50,611	$630,000	1	1	0	0	0	0	0	2	2	0	0	0	-1	0	0	0	0	0	1	0	0	0	0	0	1	3	1	1	0		4	4	62	36	No	Yes	
WQ001	All WQ Threats	Develop a water quality monitoring program for Port Stephens.	Water quality monitoring should consider aquatic ecosystem health.	Alert	All	PSC	DCCEEW - EHG	$30,000	Year 1	$0	$30,000	2	0	0	0	0	0	0	0	2	2	2	2	0	0	0	2	0	0	0	2	2	0	2	2	2	6	10	2	2	4	20	10	1	10	Yes	No	Council have determined this option is no longer required due to the targeted nature of the water quality monitoring proposed for option WQ003.
WQ002	All WQ Threats	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	There are a number of stakeholders engaging in monitoring. This option facilitates ease of data sharing for water quality monitoring, studies and investigations.	Alert	All	PSC	DCCEEW - EHG, DPI - Fisheries, DPI - Marine Parks, MCC	$0	Year 1	$0	$0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	2	2	0	2	2	2	2	10	1	2	3	15	15	9	2	Yes	Yes	There is currently no such formal arrangement in place to facilitate data sharing and knowledge building for Port Stephens as a whole.

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WQ003	All WQ Threats	Implement a Water Quality Monitoring Program focussed on risk to aquatic recreation. As a secondary objective, the monitoring should evaluate catchment pollutant inputs.	The health of aquatic recreational users can also be impacted by poor water quality, in particular faecal contamination. This option proposes to sample popular swimming beaches during the peak swimming season to evaluate risk to people engaging in primary and secondary contact recreational activities. As a secondary objective for the water quality monitoring program, sampling for key parameters (i.e. nutrients) will also be undertaken at key stormwater outlets at the same locations with a view to identifying potentially problematic pollutant sources in the catchment.	Alert	Shoal Bay Beach Little Beach Nelson Bay Beach Corlette	PSC	DCCEEW - EHG	$22,500	Year 1 and ongoing	$73,100	$753,500	3	0	0	0	0	0	0	0	2	0	1	2	0	1	0	1	0	1	0	1	1	0	2	1	2	6	7	2	2	4	17	6	3	20	Yes	Yes	Council currently lack a water quality monitoring program.
WQ004	BD Threat 1	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Port Stephens is an environmentally sensitive waterway with conservation significance. There is a need to minimise the impact of urban stormwater runoff. Ancillary benefits relate to visual amenity and wildlife corridors.	Avoid future impact	All	PSC	DPHI - Planning	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	2	1	2	2	0	2	1	0	0	0	2	0	2	1	2	0	0	9	5	0	1	1	15	15	9	2	No	Yes	Required for adequate consideration of impacts of development and for future planning.
WQ005	WQ Threat 1	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	The practices of private landholders are a key diffuse source of stormwater pollutants.	Alert	All	PSC	NA	$30,000	Year 2 and ongoing	$0	$30,000	2	0	0	0	0	0	0	0	2	1	2	2	2	0	0	0	0	0	0	0	1	0	1	0	1	5	3	1	1	2	10	5	32	26	Yes	Yes	This is an important activity to support the community to address potential water quality issues, noting also the sensitivity of the receiving environment.
WQ007	WQ Threat 4	Undertake an investigation to identify wastewater pump stations in the Port Stephens catchment that require upgrading as part of a broader wastewater pump station improvement program that will reduce the risk of wastewater overflows by providing additional emergency storage at selected sites.	The community has expressed concern about the risk of overflows from the wastewater pump station in Shoal Bay. However, HWC advised that addressing this risk is part of a broader program and has committed to undertaking the initial investigation to scope the improvements that might be required (if any) at this site and others in the catchment.	Active intervention	Port Stephens	HWC	NA	$100,000	Year 1	$0	$100,000	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	3	1	1	2	6	3	51	47	Yes	Yes	
WQ008	WQ Threat 1	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Studies have shown dog faeces is a material source of faecal contamination in coastal waters. Stakeholders identified that off-leash dogs can disturb other recreational users and can have a material impact on migratory waders and shorebirds. Reference should also be made to Option WQ005, which provides for community education.	Active intervention	All	PSC	NA	$20,000	Year 2	$0	$20,000	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2	3	1	1	2	7	4	47	36	No	Yes	This option supports Council's ongoing operations.
WQ009	WQ Threat 4	Beachwatch monitoring program for recreational water quality at ocean beaches (continued program).	The Beachwatch Program, in partnership with NSW DCCEEW, is undertaken every year from the start of November to the end of March, with five samples collected each month from four ocean beaches.	Active intervention	Box Beach Fingal Beach One Mile Beach Zenith Beach	HWC	DCCEEW - EHG	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	2	0	2	2	0	0	0	0	0	0	0	2	0	0	1	0	2	4	5	2	2	4	13	13	17	5	No	Yes	
WQ010	WQ Threat 5	Support the community to dispose of recreational fishing waste appropriately.	Install tackle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters. Three tackle bins have been manufactured and installed by the South Tomaree Community Associated to date. OzFish can provide tackle bins upon request. Council could assist the community with	Alert	All	PSC	DPI - Fisheries	$0	Year 1 and ongoing	$0	$0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	1	1	0	1	4	2	2	4	9	9	37	11	Yes	Yes	

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			installation and education programs that promote the use of the bins via Council's webpage, environmental newsletter, and local media. DPI - Fisheries offer programmes for community Tackle Bins.																																													

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WQ001	All WQ Threats	Develop a water quality monitoring program for Port Stephens.	Water quality monitoring should consider aquatic ecosystem health.	Alert	All	PSC	DCCEEW - EHG	Council, C&E Grants	$30,000	Year 1	$0	$30,000	2	6	10	2	2	4	20	10	1	10	Yes	No	Council have determined this option is no longer required due to the targeted nature of the water quality monitoring proposed for option WQ003.
CH073	All CH Threats	Develop a climate change adaptation strategy for the Shoal Bay precinct.	The adaptation plan should aim to develop a more detailed understanding of the existing and future risk from coastal hazards to natural and built assets and infrastructure in Shoal Bay which can then be discussed with the stakeholders with respect to the key attributes and activities undertaken in Shoal Bay that the community would like to maintain into the future and under climate change conditions. One key issue that has been identified to date is the risk to Shoal Bay Road from coastal hazards - it is the only road servicing this locality. The output of the plan will be an agreed and costed adaptation pathway.	Planning for change	Shoal Bay	PSC	DCCEEW - EHG, Utilities (e.g. HWC), NPWS, DPHI - Crown Lands	Council, C&E Grants	$200,000	Year 2-3	$0	$200,000	3	4	11	2	2	4	19	6	2	20	Yes	Yes	Critical to future planning of the area, which is highly valued area for community and tourists. Implement concurrently with Option CH017.
CH009	CH Threat 2	Install additional Coast Snap monitoring point at Fingal Beach.	Coast Snap monitoring points provide valuable data about shoreline changes over time. There are already official CoastSnap points at Shoal Bay, Nelson Bay and Birubi Point.	Active interventi on	Fingal Bay	PSC	DCCEEW - EHG	Council, C&E Grants	$11,800	Year 2	$7,000	$74,800	2	4	9	2	2	4	17	9	3	11	Yes	Yes	This would be a useful addition to the CoastSnap network in Port Stephens to assist with management of this popular beach.
CH082	All CH Threats	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	NPWS periodically updates their PoMs for National Parks, Nature Reserves and other National Park Estate lands.	Planning for change	National Parks & Nature Reserves	NPWS	NA	NPWS	$0	As required	$0	$0	1	4	9	2	2	4	17	17	3	1		Yes	
WQ003	All WQ Threats	Implement a Water Quality Monitoring Program focussed on risk to aquatic recreation. As a secondary objective, the monitoring should evaluate catchment pollutant inputs.	The health of aquatic recreational users can also be impacted by poor water quality, in particular faecal contamination. This option proposes to sample popular swimming beaches during the peak swimming season to evaluate risk to people engaging in primary and secondary contact recreational activities. As a secondary objective for the water quality monitoring program, sampling for key parameters (i.e. nutrients) will also be undertaken at key stormwater outlets at the same locations with a view to identifying potentially problematic pollutant sources in the catchment.	Alert	Shoal Bay Beach Little Beach Nelson Bay Beach Corlette	PSC	DCCEEW - EHG	Council, C&E Grants	$22,500	Year 1 and ongoing	$73,100	$753,500	3	6	7	2	2	4	17	6	3	20	Yes	Yes	Council currently lack a water quality monitoring program.
CH029	CH Threat 5	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Following a recent coastal storm that damaged the road, Foreshore Drive was closed until such time as Council constructed a new bridge. It is apparent the risk to natural and built assets at this location will increase under climate change conditions. The protection of Mambo wetlands is an important issue for the community and needs special consideration, to include a water balance and hydrological study.	Planning for change	Salamand er Bay	PSC	NA	Council, C&E Grants	$200,000	Year 5 to 6	$0	$200,000	3	3	9	2	2	4	16	5	6	26	Yes	Yes	Critical to address future risk from climate change and how the community and Council will adapt.
CH072	CH Threats 1 and 2	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	The erosion hazard mapping prepared in Stage 2 of the CMP only covered the open coast. The lack of erosion hazard mapping in the Inner and Outer Port means that there is a lack of information about the potential risk from shoreline erosion and how the risk will change over time. The lack of erosion hazard lines also means that it is not possible to undertake distribution analyses to identify beneficiaries of coastal protection works in the Inner and Outer Port and therefore any such works would not be eligible for funding under the C&E Grants program. It is noted that this would result in the need to review the adequacy of the new provisions of the LEP and DCP relating to coastal hazards developed under management action CH011 and updates to these provisions may be required at that time. The coastal risk planning mapping would also require updating to incorporate the new hazard extents.	Alert	Inner Port Outer Port	PSC	DCCEEW - EHG	Council, C&E Grants	$350,000	Year 1 to 2	$0	$350,000	3	2	10	2	2	4	16	5	6	26	Yes	Yes	This is a critical activity to enable future planning and support future CMPs.
E018	BD Threat 2	Prepare a new, updated Plan of Management for Mambo Wetlands.	The current PoM for Mambo Wetlands was prepared in 2006 and could benefit from an update to better reflect the changes in the statutory environment and catchment land use, as well as the current condition, threats and pressures affecting the wetland. The new PoM	Active interventi on	Mambo Wetlands	PSC	NA	Council, C&E Grants, NSW	$100,000	Year 3	$0	$100,000	2	7	5	2	2	4	16	8	6	16	Yes	Yes	

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			should reflect the outcomes of related management actions E008 (Ecological survey of Mambo Wetlands) and CH029 (Adaptation Plan for Foreshore Drive locality).					Environmental Trust (Protecting our Places)																	
CH003	All CH Threats	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	A similar study is currently underway for the Worimi Conservation Lands and this study proposes to evaluate risk to sites located on Council land and Crown land managed by Council.	Planning for change	All	PSC	NA	Council, C&E Grants, Aboriginal Cultural Heritage Grants, NSW Environmental Trust (Protecting our Places)	$175,000	Year 4	$0	$175,000	3	4	7	2	2	4	15	5	9	26	Yes	Yes	
E012	RA Threat 2	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Sand management is a key issue for the study area and requires ongoing management by Council. In some locations, aeolian transport of sand is significant and can inundate recreational areas, accessways and other assets. In other locations coastal sediment transport processes (e.g. littoral drift) can result in accretion of sand in some locations and/or erosion others. Sand carting or beach scraping may be required to address these issues. At the same time, foreshore vegetation, dunes and accessways are subject to coastal erosion, an issue that may be compounded by members of the public cutting across dunes to access the beach rather than using formal accessways, resulting in loss of vegetation and further erosion. This compromises the integrity of the dunes, which function to provide protection for landward assets and also have ecosystem value. Beach accessways can become unsafe at times due to erosion (e.g. undermining) and regularly require repairs or replacement. Hence there is a need for ongoing active management of public beaches and dunes.	Active intervention	All	PSC	NA	Council, C&E Grants	$25,000	Year 1 and ongoing	$140,000	$1,425,000	4	4	7	2	2	4	15	4	9	36	Yes	Yes	There is an ongoing requirement to undertake work to protect and enhance foreshore public lands managed by Council, as well as manage the risks to public safety and the environment.
RA012	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Undertake works to control public access and revegetate the dune. A combination of high intensity public visitation and periodic erosion events has resulted in a need to repair or replace dune fencing, restrict access through eroded locations, and re-vegetate sections of the dune. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$450,000	Year 1 and ongoing	$55,100	$945,900	3	4	8	2	1	3	15	5	9	26	Yes	Yes	This option is critical to address the existing erosion issues and to provide future protection, implemented in conjunction with sand carting. This area is highly valued by the community.
WQ002	All WQ Threats	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	There are a number of stakeholders engaging in monitoring. This option facilitates ease of data sharing for water quality monitoring, studies and investigations.	Alert	All	PSC	DCCEEW - EHG, DPI - Fisheries, DPI - Marine Parks, MCC	Council	$0	Year 1	$0	$0	1	2	10	1	2	3	15	15	9	2	Yes	Yes	There is currently no such formal arrangement in place to facilitate data sharing and knowledge building for Port Stephens as a whole.
WQ004	BD Threat 1	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Port Stephens is an environmentally sensitive waterway with conservation significance. There is a need to minimise the impact of urban stormwater runoff. Ancillary benefits relate to visual amenity and wildlife corridors.	Avoid future impact	All	PSC	DPHI - Planning	Council	$0	Year 1 and ongoing	$0	$0	1	9	5	0	1	1	15	15	9	2	No	Yes	Required for adequate consideration of impacts of development and for future planning.

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CH001	All CH Threats	Coastal hazard monitoring strategy.	There is opportunity to build knowledge on the impact of coastal hazards on Port Stephens including long-term climate change. Monitoring will also inform adaptive management as identified in this CMP. The monitoring should consider: • measuring the impacts of climate change, • improving understanding of coastal processes and the impacts of events on the coastal zone, • tracking change or identifying trends, and • identifying if triggers for adaptive management have been reached for relevant management actions. This option is linked to option CH009, which proposes an additional CoastSnap monitoring station as part of Council's existing suite of CoastSnap locations. The CoastSnap data and analyses should form part of the monitoring program.	Alert	All	PSC	DCCEEW - EHG	Council, C&E Grants	$15,000	Year 1 and ongoing	$67,000	$685,000	3	4	6	2	2	4	14	5	14	26	Yes	Yes	Required for appropriate risk management for land use planning, asset management and other future planning. Critical knowledge building activity.
CH011	All CH Threats	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	To provide mitigation of risk to life and property arising from coastal hazards for existing and proposed development.	Planning for change	All	PSC	NA	Council	$0	Year 1	$0	$0	1	4	7	1	2	3	14	14	14	4	Yes	Yes	Required for future land use planning.
DI001	ME Threat 1	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	On 12 July 2023 the Federal Minister for the Climate Change and Energy declared the Hunter Offshore Renewable Area, extending offshore from Norah Head in the South to Port Stephens in the north. Being offshore of the study area for this CMP, there is potential for the infrastructure to pass through the study area. This option proposes a Memorandum of Understanding between Council and the WCLB (which includes Native Title claimants for the relevant State waters) to share information and work together to ensure sustainable coastal and offshore development.	Avoid future impact	All	PSC	WCLB	Council	$0	Year 1 to 5	$5,000	$25,000	2	4	8	1	1	2	14	7	14	17	Yes	Yes	This option is appropriate in the context of ongoing support and partnership between Council and the WCLB to management of coastal land.
HE001	RA Threat 2	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Traditional Owners and Knowledge Holders play an important role in providing input on various projects and activities undertaken in the coastal zone by Council (and vice versa) and this function would benefit from formal acknowledgement and support.	Planning for change	National Parks & Nature Reserves	PSC	NA	Council, C&E Grants	$75,000	Year 1 to 2	$0	$75,000	2	4	5	2	2	4	13	7	17	17	Yes	Yes	
WQ009	WQ Threat 4	Beachwatch monitoring program for recreational water quality at ocean beaches (continued program).	The Beachwatch Program, in partnership with NSW DCCEEW, is undertaken every year from the start of November to the end of March, with five samples collected each month from four ocean beaches.	Active intervention	Box Beach Fingal Beach One Mile Beach Zenith Beach	HWC	DCCEEW - EHG	HWC	$0	Year 1 and ongoing	$0	$0	1	4	5	2	2	4	13	13	17	5	No	Yes	
CH005	CH Threat 5	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Large areas of land along the Tilligerry Peninsula are subject to coastal inundation in the present day, a risk that will increase in future. In addition, the low-lying land of the peninsula is also at risk from permanent tidal inundation. This has implications for the overarching approach for managing risk from all coastal and flood hazards.	Planning for change	All	PSC	DCCEEW - EHG, Utilities (e.g. HWC), TfNSW, NPWS, DPHI - Crown Lands, Worimi LALC	Council, C&E Grants	$200,000	Year 6-7	$0	$200,000	3	3	7	1	1	2	12	4	19	36	Yes	Yes	Necessary Strategy for future planning and adaptation to climate change.
CH007	CH Threat 3	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Dune transgression was identified as a key threat to natural, cultural and built assets along Stockton Beach. Dune management for coastal hazard protection.	Active intervention	Stockton Sand Dunes	PSC	WCLB	WCLB, Council & C&E Grants, NSW Environmental Trust (e.g. Environmental Research /	$510,000	Year 2	$102,000	$1,326,000	4	2	6	2	2	4	12	3	19	47	Yes	Yes	Requires confirmation by WCLB prior to inclusion in CMP.

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								Restoration and Rehabilitation), CoastCare Grants																	
CH074	RA Threat 2	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Some owners of foreshore properties are of the understanding that Council will be wholly responsible for the protection of foreshore land from coastal hazards. Consistent with the State Government policy, Council wishes to make clear that their priority is the protection of public land and assets. Further, the community members have identified that equity and prioritisation of public benefit is important to them. In addition, there is an expectation that Council will maintain existing works, whether or not they are owned by Council. Council wishes to clarify that they are only responsible for maintenance of seawalls for which they are the identified owner or responsible party (e.g. under a Crown lands licence).	Planning for change	All	PSC	NA	Council, C&E Grants	$25,000	Year 2	$0	$25,000	2	2	7	1	2	3	12	6	19	20	Yes	Yes	Council lack an existing policy. Hence, the option is necessary to address the community's expectations and clearly communicate Council's position.
E001	BD Threat 2	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.	These plans have been developed by Hunter LLS and provide for coordinated pest and weed control by the relevant stakeholders. Biosecurity was identified as a key threat to coastal biodiversity.	Active intervention	All	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$25,000	$250,000	3	2	6	2	2	4	12	4	19	36	Yes	Yes	
E008	BD Threat 1	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	The most recent survey was undertaken over 20 years ago. In addition, the recent replacement of the Foreshore Drive culverts with a bridge has altered the hydrological regime in the wetlands and is likely to have implications for wetland biodiversity.	Alert	Mambo Wetlands	PSC	NA	Council, C&E Grants	$75,000	Year 2	$0	$75,000	2	4	4	2	2	4	12	6	19	20	Yes	Yes	This an important wetland managed by Council and is highly values by the community.
E013	RA Threat 2	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	The current approach to managing these activities is not wholly effective and could benefit from increased compliance and enforcement to discourage inappropriate activities.	Active intervention	Open Coast	NPWS, WCLB	NA	NPWS & WCLB	$0	Year 1 and ongoing	$0	$0	1	3	6	1	2	3	12	12	19	6	Yes	Yes	
E014	WQ Threat 1	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	There are a number of activities listed in the forthcoming Plan that identify Council as an implementation partner.	Active intervention	All	PSC	DPI - Marine Parks	Council	$0	Year 1 and ongoing	$0	$0	1	5	4	1	2	3	12	12	19	6	Yes	Yes	
E017	RA Threat 2	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	This option was added as a result of changes to Action E013, noting that Council had no jurisdiction on National Park or Worimi Conservation lands. However, Action E013 can be complemented by ongoing regulation of these activities by Council where they do have jurisdiction.	Active intervention	All	PSC	NA	Council	$0	Year 1 and ongoing	$0	$0	1	3	6	1	2	3	12	12	19	6	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.
RA034	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Nelson Bay Beach	PSC	NA	Council, C&E Grants	$114,000	Year 4	$7,000	$156,000	3	3	6	2	1	3	12	4	19	36	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.
E002	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Informal access through the dunes is negatively impacting vegetation and the dune system in several locations along the beach. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	One Mile Beach	PSC	NA	Council, C&E Grants	$197,000	Year 3 and ongoing	$8,750	$258,250	3	3	6	1	1	2	11	4	28	36	Yes	Yes	There are ongoing issues at this location that need action as a priority. The key area is around the SLSC. There is risk to the road from dune movement.

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E011	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Fingal Bay	PSC	NA	Council, C&E Grants	$197,000	Year 4	$8,750	$249,500	3	3	6	1	1	2	11	4	28	36	No	Yes	There are ongoing key issues at this location that require action as a stand-alone option.
RA001	RA Threat 2	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Private coastal protection and other works are contributing to key threats to the coastal zone, including encroachment on public land and environmental and heritage impacts.	Avoid future impact	All	PSC	DCCEEW - EHG	Council, C&E Grants	$25,000	Year 2	$0	$25,000	2	4	4	1	2	3	11	6	28	20	Yes	Yes	This is a necessary document requested by the community to provide support and guidance to owners of foreshore land.
RA002	RA Threat 1	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Fishing and boating are key recreational activities that support the coastal economy. Sufficient and appropriate infrastructure minimises user conflicts.	Active intervention	All	PSC	TfNSW - MIDO	Council, Recreational Fishing Trust, NSW Boating Now, Destination Boat Ramp Grants	$0	Year 1 and ongoing	$0	$0	1	3	4	2	2	4	11	11	28	9	Yes	Yes	Council has adopted the plan and will undertake implementation.
CH079	CH Threat 3	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	The aeolian transport of sand into the car park and other facilities at Birubi Point is an ongoing issue. This action proposes to undertake dune stabilisation works to facilitate the accretion and capture of sand, including barrier dune reformation, fencing and revegetation.	Active intervention	Birubi Point	PSC	NA	Council, C&E Grants	$100,000	Year 2	$20,000	$260,000	3	2	4	**2**	**2**	4	10	3	32	47	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
E004	BD Threat 2	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	The Mambo Wetlands comprises a large area of Coastal Wetland. This option supports the ongoing management of this important area. When the current PoM is updated as per management action E018 (and any findings or recommendations arising from actions E008 and CH029), this management action would support implementation of the updated PoM.	Active intervention	Mambo Wetlands	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$12,000	$120,000	3	2	4	2	2	4	10	3	32	47	Yes	Yes	
HE002	BD Threat 2	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	This important site benefits from a co-management approach.	Active intervention	Soldiers Point	PSC	NA	Council, C&E Grants	$15,000	Year 1 and ongoing	$15,000	$150,000	3	2	4	2	2	4	10	3	32	47	Yes	Yes	
RA030	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Dutchmans Beach	PSC	NA	Council, C&E Grants	$52,500	Year 4	$3,675	$74,550	2	3	5	1	1	2	10	5	32	26	Yes	Yes	There are ongoing erosion issues at this location that require action. However, access is not a real issue and the effort should focus on erosion management.
WQ005	WQ Threat 1	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management	The practices of private landholders are a key diffuse source of stormwater pollutants.	Alert	All	PSC	NA	Council, C&E	$30,000	Year 2 and ongoing	$0	$30,000	2	5	3	1	1	2	10	5	32	26	Yes	Yes	This is an important activity to support the

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		practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.						Grants, Environmental Trust (Environmental education)																	community to address potential water quality issues, noting also the sensitivity of the receiving environment.
CH002	All CH Threats	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	This action will provide for the ongoing monitoring of Council's coastal structures as part of their asset management system. The monitoring framework will in the first instance require a survey to establish the baseline condition of existing structures, building on the survey undertaken for Stage 2, the BMT (2021b) Coastal Structures Audit. The outcomes of the monitoring could be used to inform any remedial or maintenance works required for the structures.	Alert	All	PSC	NA	Council	$0	Year 1 and ongoing	$24,000	$240,000	3	3	3	1	2	3	9	3	37	47	Yes	Yes	This activity is a critical asset management activity, to understand which structures require maintenance or may in future require an upgrade.
CH012	CH Threats 4 and 5	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from tidal inundation aimed at the ongoing provision of access for the community in future.	The coastal hazard study identified that several local roads are inundated in the present day due to coastal inundation. Some of these roads provide the only emergency access and egress to parts of the LGA.	Planning for change	All	PSC	TfNSW	Council, C&E Grants, Floodplain Management Grants	$200,000	Year 1 to 3	$0	$200,000	3	2	3	2	2	4	9	3	37	47	Yes	Yes	Necessary to address future risk to roads. Links to some of the adaptation plans (CH005, CH029, CH073).
E005	BD Threat 2	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.	There is an area of Littoral Rainforest located at Soldiers Point.	Active intervention	Soldiers Point	PSC	NA	Council	$0	Year 1 and ongoing	$0	$0	1	2	3	2	2	4	9	9	37	11	Yes	Yes	
E016	RA Threat 2	Encourage local volunteer groups to support dune rehabilitation activities.	Provide direction, funding and support for community involvement in dune rehabilitation projects along the coast. Coordination of volunteers is by the Strategy and Environment team, but would be delivered by the Public Domain and Services team.	Active intervention	All	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$5,000	$50,000	2	2	3	2	2	4	9	5	37	26	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.
E019	BD Threat 2	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	NPWS undertakes shorebird conservation and protection activities in accordance with approved Threatened Species Management Plans.	Active intervention	Mambo Wetlands	NPWS	NA	NPWS	$0	Ongoing	$0	$0	1	3	6	1	2		9	9	37	11	Yes	Yes	
RA011	CH Threat 2	Sand carting to provide improved beach access and amenity.	Council has historically undertaken sand carting to transfer accreted sand from the western end of the beach further east for improved beach width and volume for amenity reasons. While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$295,000	Year 1 to 10	$0	$0	1	0	5	2	2	4	9	9	37	11	No	Yes	This activity is critical to address an issue of public access and recreational amenity. The community highly values Shoal Bay Beach and it is also critical for tourism.
RA017	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location is affected by an ongoing sand deficit and would benefit from a more targeted action. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Corlette	PSC	NA	Council, C&E Grants	$16,500	Year 4	$5,250	$48,000	2	4	3	1	1	2	9	5	37	26	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.
WQ010	WQ Threat 5	Support the community to dispose of recreational fishing waste appropriately.	Install tackle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters. Three tackle bins have been manufactured and installed by the South Tomaree Community Associated to date. OzFish can provide tackle	Alert	All	PSC	DPI - Fisheries	Council, Recreational Fishing	$0	Year 1 and ongoing	$0	$0	1	1	4	2	2	4	9	9	37	11	Yes	Yes	

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			bins upon request. Council could assist the community with installation and education programs that promote the use of the bins via Council's webpage, environmental newsletter, and local media. DPI - Fisheries offer programmes for community Tackle Bins.					Trust Grant																	
RA027	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Salamander Bay	PSC	NA	Council, C&E Grants	$50,000	Year 5	$3,500	$67,500	2	4	2	1	1	2	8	4	45	36	Yes	Yes	This location is highly valued by the community.
RA031	CH Threat 1	Repair or replace stairs and fix fencing to reinstate public access from the car park.	There have been concerns raised by the community regarding the length of time these stairs have been closed. They were closed and barricaded following erosion sufficient to render the stairs inaccessible and a safety risk.	Active intervention	Dutchmans Beach	PSC	NA	Council, C&E Grants	$10,000	Year 1	$2,000	$28,000	2	0	4	2	2	4	8	4	45	36	Yes	Yes	This location is highly valued by the community.
CH075	CH Threat 7	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	It is recommended that a catchment balance assessment be undertaken to ensure the balance between catchment flows and tidal inundation risk is considered. The works would then be prioritised on a risk basis considering adjacent land use, history of issues/complaints and the potential reductions in economic damages arising from alleviation of the associated nuisance flooding.	Active intervention	All	PSC	NA	Council, C&E Grants	$175,000	Year 3	$0	$175,000	3	1	3	1	2	3	7	2	47	56	Yes	Yes	
CH077	CH Threat 1	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	This action has been included to assist Council in undertaking the preparatory activities required to facilitate implementation of the CZEAS, if triggered. It is assumed that these approvals, permits and licences would be in place for a maximum of five years, and therefore would require re-application or renewal during the 10 year period of implementation.	Emergency response	All	PSC	NA	Council	$50,000	Year 1 and Year 6	$0	$100,000	2	1	2	2	2	4	7	4	47	36	Yes	Yes	
CH083	CH Threat 5	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	There are a number of Council owned buildings that are exposed to risk from coastal inundation in the event of a coastal storm such as an East Coast Low. It is recommended that these facilities have a plan in place to mitigate the impacts of inundation and manage the safety risk to occupants at the time of such an event.	Emergency response	All	PSC	NA	Council	$0	Year 1	$0	$0	1	1	2	**2**	**2**	4	7	7	47	17		Yes	
WQ008	WQ Threat 1	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Studies have shown dog faeces is a material source of faecal contamination in coastal waters. Stakeholders identified that off-leash dogs can disturb other recreational users and can have a material impact on migratory waders and shorebirds. Reference should also be made to Option WQ005, which provides for community education.	Active intervention	All	PSC	NA	Council	$20,000	Year 2	$0	$20,000	2	2	3	1	1	2	7	4	47	36	No	Yes	This option supports Council's ongoing operations.
CH081	CH Threat 4	Install tide gates/flaps on priority stormwater outlets.	This option provides for implementation of priority works identified under option CH075 at up to 20 sites.	Active intervention	All	PSC	NA	Council, C&E Grants	$135,000	Year 4 and ongoing	$60,000	$435,000	3	2	2	**1**	**1**	2	6	2	51	56	Yes	Yes	
RA003	RA Threat 2	Develop a governance framework for coastal protection structures of unknown management status.	For many existing coastal structures the authority or person responsible for maintenance of the structure is not known and they are not maintained. Potential impacts of these structures on the environment and/or public safety and access may not be understood or managed appropriately. Liaise with Crown lands regarding the Marine Estate Management Strategy (MEMS) Breakwall governance and management project and agree to appropriate governance for foreshore structures ('breakwalls') in Port Stephens for which the party responsible for maintenance of the structure is not known.	Active intervention	All	PSC	DPHI - Crown Lands	Council	$0	Year 2	$0	$0	1	1	2	1	2	3	6	6	51	20	Yes	Yes	There are a number of seawalls in the study area for which the tenure/owner is not known and/or the structure may not have been approved. There is a need to develop an approach to managing these existing structures as they be in poor condition, and may also be adversely impacting public safety and access and the environment.
RA010	CH Threat 2	Beach nourishment for improved beach access and amenity.	The general westward trend of sand transport in Shoal Bay leads to a reduction in beach width and volume. This option proposes nourishment to increase beach volume for improved access and amenity for this popular beach. It provides a comparison with sand carting, which is Council's historic approach to managing this issue.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$2,862,500	Year 2	$0	$2,862,500	4	0	4	1	1	2	6	2	51	56	No	No	Council has determined to not proceed with this option in the current CMP due to the high cost and uncertainty

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																									around the planning approvals.
RA020	CH Threat 1	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	The intent of this option is to undertake landscaping to assist in bank stabilisation. Where necessary some geotextile matting or coir logs may be placed to assist bank stabilisation. The extent of foreshore proposed for landscaping works is around 110 m long.	Active intervention	Tanilba	PSC	NA	Council, C&E Grants	$41,750	Year 6	$2,950	$53,550	2	3	1	1	1	2	6	3	51	47	Yes	Yes	
RA036	RA Threat 2	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	The community is concerned about the ongoing erosion at this location. The proposed works would involve some minor re-profiling to create a shoreline profile similar to the nearby beach, with additional stabilisation provided by geotextile or jute meshing and coir logs, as required. Landscaping would be used to both stabilise the shoreline and control public access.	Active intervention	Kangaroo Point	PSC	NA	Council, C&E Grants	$233,000	Year 7	$21,875	$298,625	3	1	4	1	0	1	6	2	51	56	Yes	Yes	There is an existing study that examines the processes that are causing erosion at this location. There are Hunter Water assets in this location that also need protection
WQ007	WQ Threat 4	Undertake an investigation to identify wastewater pump stations in the Port Stephens catchment that require upgrading as part of a broader wastewater pump station improvement program that will reduce the risk of wastewater overflows by providing additional emergency storage at selected sites.	The community has expressed concern about the risk of overflows from the wastewater pump station in Shoal Bay. However, HWC advised that addressing this risk is part of a broader program and has committed to undertaking the initial investigation to scope the improvements that might be required (if any) at this site and others in the catchment.	Active intervention	Port Stephens	HWC	NA	HWC	$100,000	Year 1	$0	$100,000	2	1	3	1	1	2	6	3	51	47	Yes	Yes	
CH017	CH Threat 1	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Shoal Bay Road is the sole access for Shoal Bay and Fingal Bay. The section of the road east of Beach Road is close to the shoreline. In the absence of erosion hazard lines for the Outer Port, the extent and timing of coastal erosion risk to the road is unknown. This option proposes a coastal erosion risk assessment and, if required, an assessment of feasible options to protect the road.	Planning for change	Shoal Bay	PSC	NA	Council, C&E Grants	$200,000	Year 2 to 3	$0	$200,000	3	1	0	2	2	4	5	2	57	56	No	Yes	Concerns around future risk to this road based on previous experience of emergency works in the past. Critical road to the Tomaree area. To be undertaken concurrently with the adaptation plan (CH073).
CH078	CH Threat 1	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	This action applies to part of the Swan Bay seawall that is failing and requires toe protection works to ensure its ongoing functionality. In addition to the coastal inundation risk at this location, the structure is retaining land that is filled with building waste. A clean out of the stormwater outlet is also required. The seawall is adjacent to Waterfront Road, which is a Crown Road managed by Council.	Active intervention	Swan Bay	PSC	DPHI - Crown Lands	Council	$304,000	Year 3	$15,000	$409,000	3	2	2	1	0	1	5	2	57	56	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
RA016	CH Threat 2	Sand carting to provide improved beach access and amenity.	Sand carting and beach nourishment activities have previously been undertaken at Conroy Park. The ongoing sand deficit at this location results in reduction in beach volume/width. This option has been developed based on Priority Action 1 from the Management Plan for Sandy Point/Conroy Park (Whitehead and Assoc, 2015). While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Sandy Point / Conroy Park	PSC	NA	Council, C&E Grants	$122,500	Year 3	$10,000	$192,500	3	0	2	1	2	3	5	2	57	56	No	Yes	This option is critical to the use and protection of this area, which is highly valued by the community.
RA019	RA Threat 2	Access management & landscaping works.	This option relates to around 130 m length of shoreline near Danalene Parade.	Active intervention	Corlette	PSC	NA	Council, C&E Grants	$3,250	Year 6	$228	$4,160	1	3	1	1	0	1	5	5	57	26	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment and there is some vegetation protecting the foreshore (including at the narrowest points). Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, this site is not

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																									considered a high priority site by Council.
RA043	RA Threat 2	Undertake fencing and landscaping works to stabilise the foreshore .	The intent of the works would be to construct some fencing to control public access between the shoreline and the water and to implement landscaping works to facilitate bank stabilisation over a length of shoreline of about 550 m.	Active interventi on	Lemon Tree Passage	PSC	NA	Council, C&E Grants	$13,750	Year 5	$963	$18,563	2	2	2	1	0	1	5	3	57	47	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, this site is not considered a high priority site by Council.
CH022	CH Threat 1	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	At present the absence of erosion hazard mapping in the Outer Port precludes a distribution analysis to allocate costs to public and private beneficiaries of coastal protection works. This option proposes progressing previously identified options for Sandy Point so that they can be progressed promptly to implementation through the economic analyses and grant application process for co-funding by the State, PSC and benefitting individuals.	Active interventi on	Sandy Point	PSC	DPHI - Crown Lands	Council, C&E Grants	$285,000	Year 6-7	$0	$285,000	3	2	1	1	0	1	4	1	62	66	No	Yes	Critical to address the ongoing issues within this area. This enables Council to have a 'shovel ready' option for when the next CMP is prepared to enable prompt implementation (pending a CBA and acceptance of proposed funding with identified beneficiaries).
CH080	CH Threat 1	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	This action is proposing design and investigation of a permanent solution to the ongoing coastal erosion issue at this location.	Active interventi on	Nelson Bay Beach	PSC	DPHI - Crown Lands	Council, C&E Grants	$87,000	Year 1	$0	$87,000	2	2	0	1	1	2	4	2	62	56	No	Yes	Council requested addition of this option to address ongoing erosion issues in this location.
RA041	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 1,150 m.	Active interventi on	Lemon Tree Passage	PSC	NA	Council, C&E Grants	$28,750	Year 6	$2,013	$36,800	2	3	1	0	0	0	4	2	62	56	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, and noting also the width of public land at this location to accommodate cycles of erosion and accretion, this site is not considered a high priority site by Council.
RA045	CH Threat 7	Dredging to improve access to the boat ramp and Soldiers Point marina.	Naturally occurring sediment transport processes can result in the accretion of sand in navigational areas, limiting access to boat ramps or marinas. This action provides for maintenance dredging to address this issue.	Active interventi on	Little Beach, Nelson Bay, Soldiers Point,	PSC	NA	Council	$174,500	Year 1 and ongoing (as required)	$50,611	$630,000	1	3	1	1	0		4	4	62	36	No	Yes	

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					Taylors Beach																				
CH023	CH Threat 1	Undertake maintenance works / repairs to the existing rock revetment.	An audit of coastal structures undertaken by BMT (2021) concluded the existing foreshore protection measures at Sandy Point require significant repairs and modifications to achieve functionality. This option proposes maintenance works in the form of toe protection works to improve the functionality of the existing structure on the eastern shoreline of Sandy Point. It is noted the structure is an abandoned asset.	Active intervention	Sandy Point	PSC	DPHI - Crown Lands	Council	$1,156,500	Year 2	$16,500	$1,305,000	4	1	1	0	1	1	3	1	66	66	No	Yes	Critical to the protection of this area. Ongoing issues within this area due to historical protection works. Maintenance of existing rock revetment.
RA038	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 480 m.	Active intervention	Soldiers Point	PSC	NA	Council, C&E Grants	$24,000	Year 7	$1,680	$29,040	2	2	1	0	0	0	3	2	67	56	No	No	While there is opportunity to provide native vegetation for habitat value and dune stabilisation, the location is subject to lower intensity usage and has limited space available. It is not considered a high priority site by Council.

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CH082	All CH Threats	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	NPWS periodically updates their PoMs for National Parks, Nature Reserves and other National Park Estate lands.	Planning for change	National Parks & Nature Reserves	NPWS	NA	NPWS	$0	As required	$0	$0	1	4	9	2	2	4	17	17	3	1		Yes	
WQ002	All WQ Threats	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	There are a number of stakeholders engaging in monitoring. This option facilitates ease of data sharing for water quality monitoring, studies and investigations.	Alert	All	PSC	DCCEEW - EHG, DPI - Fisheries, DPI - Marine Parks, MCC	Council	$0	Year 1	$0	$0	1	2	10	1	2	3	15	15	9	2	Yes	Yes	There is currently no such formal arrangement in place to facilitate data sharing and knowledge building for Port Stephens as a whole.
WQ004	BD Threat 1	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Port Stephens is an environmentally sensitive waterway with conservation significance. There is a need to minimise the impact of urban stormwater runoff. Ancillary benefits relate to visual amenity and wildlife corridors.	Avoid future impact	All	PSC	DPHI - Planning	Council	$0	Year 1 and ongoing	$0	$0	1	9	5	0	1	1	15	15	9	2	No	Yes	Required for adequate consideration of impacts of development and for future planning.
CH011	All CH Threats	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	To provide mitigation of risk to life and property arising from coastal hazards for existing and proposed development.	Planning for change	All	PSC	NA	Council	$0	Year 1	$0	$0	1	4	7	1	2	3	14	14	14	4	Yes	Yes	Required for future land use planning.
WQ009	WQ Threat 4	Beachwatch monitoring program for recreational water quality at ocean beaches (continued program).	The Beachwatch Program, in partnership with NSW DCCEEW, is undertaken every year from the start of November to the end of March, with five samples collected each month from four ocean beaches.	Active intervention	Box Beach Fingal Beach One Mile Beach Zenith Beach	HWC	DCCEEW - EHG	HWC	$0	Year 1 and ongoing	$0	$0	1	4	5	2	2	4	13	13	17	5	No	Yes	
E013	RA Threat 2	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	The current approach to managing these activities is not wholly effective and could benefit from increased compliance and enforcement to discourage inappropriate activities.	Active intervention	Open Coast	NPWS, WCLB	NA	NPWS & WCLB	$0	Year 1 and ongoing	$0	$0	1	3	6	1	2	3	12	12	19	6	Yes	Yes	
E014	WQ Threat 1	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	There are a number of activities listed in the forthcoming Plan that identify Council as an implementation partner.	Active intervention	All	PSC	DPI - Marine Parks	Council	$0	Year 1 and ongoing	$0	$0	1	5	4	1	2	3	12	12	19	6	Yes	Yes	
E017	RA Threat 2	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	This option was added as a result of changes to Action E013, noting that Council had no jurisdiction on National Park or Worimi Conservation lands. However, Action E013 can be complemented by ongoing regulation of these activities by Council where they do have jurisdiction.	Active intervention	All	PSC	NA	Council	$0	Year 1 and ongoing	$0	$0	1	3	6	1	2	3	12	12	19	6	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.
RA002	RA Threat 1	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Fishing and boating are key recreational activities that support the coastal economy. Sufficient and appropriate infrastructure minimises user conflicts.	Active intervention	All	PSC	TfNSW - MIDO	Council, Recreational Fishing Trust, NSW Boating Now, Destination Boat	$0	Year 1 and ongoing	$0	$0	1	3	4	2	2	4	11	11	28	9	Yes	Yes	Council has adopted the plan and will undertake implementation.

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								Ramp Grants																	
WQ001	All WQ Threats	Develop a water quality monitoring program for Port Stephens.	Water quality monitoring should consider aquatic ecosystem health.	Alert	All	PSC	DCCEEW - EHG	Council, C&E Grants	$30,000	Year 1	$0	$30,000	2	6	10	2	2	4	20	10	1	10	Yes	No	Council have determined this option is no longer required due to the targeted nature of the water quality monitoring proposed for option WQ003.
CH009	CH Threat 2	Install additional Coast Snap monitoring point at Fingal Beach.	Coast Snap monitoring points provide valuable data about shoreline changes over time. There are already official CoastSnap points at Shoal Bay, Nelson Bay and Birubi Point.	Active intervention	Fingal Bay	PSC	DCCEEW - EHG	Council, C&E Grants	$11,800	Year 2	$7,000	$74,800	2	4	9	2	2	4	17	9	3	11	Yes	Yes	This would be a useful addition to the CoastSnap network in Port Stephens to assist with management of this popular beach.
E005	BD Threat 2	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.	There is an area of Littoral Rainforest located at Soldiers Point.	Active intervention	Soldiers Point	PSC	NA	Council	$0	Year 1 and ongoing	$0	$0	1	2	3	2	2	4	9	9	37	11	Yes	Yes	
E019	BD Threat 2	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	NPWS undertakes shorebird conservation and protection activities in accordance with approved Threatened Species Management Plans.	Active intervention	Mambo Wetlands	NPWS	NA	NPWS	$0	Ongoing	$0	$0	1	3	6	1	2		9	9	37	11	Yes	Yes	
RA011	CH Threat 2	Sand carting to provide improved beach access and amenity.	Council has historically undertaken sand carting to transfer accreted sand from the western end of the beach further east for improved beach width and volume for amenity reasons. While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$295,000	Year 1 to 10	$0	$0	1	0	5	2	2	4	9	9	37	11	No	Yes	This activity is critical to address an issue of public access and recreational amenity. The community highly values Shoal Bay Beach and it is also critical for tourism.
WQ010	WQ Threat 5	Support the community to dispose of recreational fishing waste appropriately.	Install tackle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters. Three tackle bins have been manufactured and installed by the South Tomaree Community Associated to date. OzFish can provide tackle bins upon request. Council could assist the community with installation and education programs that promote the use of the bins via Council's webpage, environmental newsletter, and local media. DPI - Fisheries offer programmes for community Tackle Bins.	Alert	All	PSC	DPI - Fisheries	Council, Recreational Fishing Trust Grant	$0	Year 1 and ongoing	$0	$0	1	1	4	2	2	4	9	9	37	11	Yes	Yes	
E018	BD Threat 2	Prepare a new, updated Plan of Management for Mambo Wetlands.	The current PoM for Mambo Wetlands was prepared in 2006 and could benefit from an update to better reflect the changes in the statutory environment and catchment land use, as well as the current condition, threats and pressures affecting the wetland. The new PoM should reflect the outcomes of related management actions E008 (Ecological survey of Mambo Wetlands) and CH029 (Adaptation Plan for Foreshore Drive locality).	Active intervention	Mambo Wetlands	PSC	NA	Council, C&E Grants, NSW Environmental Trust (Protecting our Places)	$100,000	Year 3	$0	$100,000	2	7	5	2	2	4	16	8	6	16	Yes	Yes	

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DI001	ME Threat 1	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	On 12 July 2023 the Federal Minister for the Climate Change and Energy declared the Hunter Offshore Renewable Area, extending offshore from Norah Head in the South to Port Stephens in the north. Being offshore of the study area for this CMP, there is potential for the infrastructure to pass through the study area. This option proposes a Memorandum of Understanding between Council and the WCLB (which includes Native Title claimants for the relevant State waters) to share information and work together to ensure sustainable coastal and offshore development.	Avoid future impact	All	PSC	WCLB	Council	$0	Year 1 to 5	$5,000	$25,000	2	4	8	1	1	2	14	7	14	17	Yes	Yes	This option is appropriate in the context of ongoing support and partnership between Council and the WCLB to management of coastal land.
HE001	RA Threat 2	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Traditional Owners and Knowledge Holders play an important role in providing input on various projects and activities undertaken in the coastal zone by Council (and vice versa) and this function would benefit from formal acknowledgement and support.	Planning for change	National Parks & Nature Reserves	PSC	NA	Council, C&E Grants	$75,000	Year 1 to 2	$0	$75,000	2	4	5	2	2	4	13	7	17	17	Yes	Yes	
CH083	CH Threat 5	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	There are a number of Council owned buildings that are exposed to risk from coastal inundation in the event of a coastal storm such as an East Coast Low. It is recommended that these facilities have a plan in place to mitigate the impacts of inundation and manage the safety risk to occupants at the time of such an event.	Emergency response	All	PSC	NA	Council	$0	Year 1	$0	$0	1	1	2	**2**	**2**	4	7	7	47	17		Yes	
CH073	All CH Threats	Develop a climate change adaptation strategy for the Shoal Bay precinct.	The adaptation plan should aim to develop a more detailed understanding of the existing and future risk from coastal hazards to natural and built assets and infrastructure in Shoal Bay which can then be discussed with the stakeholders with respect to the key attributes and activities undertaken in Shoal Bay that the community would like to maintain into the future and under climate change conditions. One key issue that has been identified to date is the risk to Shoal Bay Road from coastal hazards - it is the only road servicing this locality. The output of the plan will be an agreed and costed adaptation pathway.	Planning for change	Shoal Bay	PSC	DCCEEW - EHG, Utilities (e.g. HWC), NPWS, DPHI - Crown Lands	Council, C&E Grants	$200,000	Year 2-3	$0	$200,000	3	4	11	2	2	4	19	6	2	20	Yes	Yes	Critical to future planning of the area, which is highly valued area for community and tourists. Implement concurrently with Option CH017.
WQ003	All WQ Threats	Implement a Water Quality Monitoring Program focussed on risk to aquatic recreation. As a secondary objective, the monitoring should evaluate catchment pollutant inputs.	The health of aquatic recreational users can also be impacted by poor water quality, in particular faecal contamination. This option proposes to sample popular swimming beaches during the peak swimming season to evaluate risk to people engaging in primary and secondary contact recreational activities. As a secondary objective for the water quality monitoring program, sampling for key parameters (i.e. nutrients) will also be undertaken at key stormwater outlets at the same locations with a view to identifying potentially problematic pollutant sources in the catchment.	Alert	Shoal Bay Beach Little Beach Nelson Bay Beach Corlette	PSC	DCCEEW - EHG	Council, C&E Grants	$22,500	Year 1 and ongoing	$73,100	$753,500	3	6	7	2	2	4	17	6	3	20	Yes	Yes	Council currently lack a water quality monitoring program.
CH074	RA Threat 2	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Some owners of foreshore properties are of the understanding that Council will be wholly responsible for the protection of foreshore land from coastal hazards. Consistent with the State Government policy, Council wishes to make clear that their priority is the protection of public land and assets. Further, the community members have identified that equity and prioritisation of public benefit is important to them. In addition, there is an expectation that Council will maintain existing works, whether or not they are owned by Council. Council wishes to clarify that they are only responsible for maintenance of seawalls for which they are the identified owner or responsible party (e.g. under a Crown lands licence).	Planning for change	All	PSC	NA	Council, C&E Grants	$25,000	Year 2	$0	$25,000	2	2	7	1	2	3	12	6	19	20	Yes	Yes	Council lack an existing policy. Hence, the option is necessary to address the community's expectations and clearly communicate Council's position.

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E008	BD Threat 1	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	The most recent survey was undertaken over 20 years ago. In addition, the recent replacement of the Foreshore Drive culverts with a bridge has altered the hydrological regime in the wetlands and is likely to have implications for wetland biodiversity.	Alert	Mambo Wetlands	PSC	NA	Council, C&E Grants	$75,000	Year 2	$0	$75,000	2	4	4	2	2	4	12	6	19	20	Yes	Yes	This an important wetland managed by Council and is highly values by the community.
RA001	RA Threat 2	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Private coastal protection and other works are contributing to key threats to the coastal zone, including encroachment on public land and environmental and heritage impacts.	Avoid future impact	All	PSC	DCCEEW - EHG	Council, C&E Grants	$25,000	Year 2	$0	$25,000	2	4	4	1	2	3	11	6	28	20	Yes	Yes	This is a necessary document requested by the community to provide support and guidance to owners of foreshore land.
RA003	RA Threat 2	Develop a governance framework for coastal protection structures of unknown management status.	For many existing coastal structures the authority or person responsible for maintenance of the structure is not known and they are not maintained. Potential impacts of these structures on the environment and/or public safety and access may not be understood or managed appropriately. Liaise with Crown lands regarding the Marine Estate Management Strategy (MEMS) Breakwall governance and management project and agree to appropriate governance for foreshore structures ('breakwalls') in Port Stephens for which the party responsible for maintenance of the structure is not known.	Active intervention	All	PSC	DPHI - Crown Lands	Council	$0	Year 2	$0	$0	1	1	2	1	2	3	6	6	51	20	Yes	Yes	There are a number of seawalls in the study area for which the tenure/owner is not known and/or the structure may not have been approved. There is a need to develop an approach to managing these existing structures as they be in poor condition, and may also be adversely impacting public safety and access and the environment.
CH029	CH Threat 5	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Following a recent coastal storm that damaged the road, Foreshore Drive was closed until such time as Council constructed a new bridge. It is apparent the risk to natural and built assets at this location will increase under climate change conditions. The protection of Mambo wetlands is an important issue for the community and needs special consideration, to include a water balance and hydrological study.	Planning for change	Salamander Bay	PSC	NA	Council, C&E Grants	$200,000	Year 5 to 6	$0	$200,000	3	3	9	2	2	4	16	5	6	26	Yes	Yes	Critical to address future risk from climate change and how the community and Council will adapt.
CH072	CH Threats 1 and 2	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	The erosion hazard mapping prepared in Stage 2 of the CMP only covered the open coast. The lack of erosion hazard mapping in the Inner and Outer Port means that there is a lack of information about the potential risk from shoreline erosion and how the risk will change over time. The lack of erosion hazard lines also means that it is not possible to undertake distribution analyses to identify beneficiaries of coastal protection works in the Inner and Outer Port and therefore any such works would not be eligible for funding under the C&E Grants program. It is noted that this would result in the need to review the adequacy of the new provisions of the LEP and DCP relating to coastal hazards developed under management action CH011 and updates to these provisions may be required at that time. The coastal risk planning mapping would also require updating to incorporate the new hazard extents.	Alert	Inner Port Outer Port	PSC	DCCEEW - EHG	Council, C&E Grants	$350,000	Year 1 to 2	$0	$350,000	3	2	10	2	2	4	16	5	6	26	Yes	Yes	This is a critical activity to enable future planning and support future CMPs.
CH003	All CH Threats	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	A similar study is currently underway for the Worimi Conservation Lands and this study proposes to evaluate risk to sites located on Council land and Crown land managed by Council.	Planning for change	All	PSC	NA	Council, C&E Grants, Aboriginal Cultural Heritage Grants, NSW	$175,000	Year 4	$0	$175,000	3	4	7	2	2	4	15	5	9	26	Yes	Yes	

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								Environmental Trust (Protecting our Places)																	
RA012	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Undertake works to control public access and revegetate the dune. A combination of high intensity public visitation and periodic erosion events has resulted in a need to repair or replace dune fencing, restrict access through eroded locations, and re-vegetate sections of the dune. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$450,000	Year 1 and ongoing	$55,100	$945,900	3	4	8	2	1	3	15	5	9	26	Yes	Yes	This option is critical to address the existing erosion issues and to provide future protection, implemented in conjunction with sand carting. This area is highly valued by the community.
CH001	All CH Threats	Coastal hazard monitoring strategy.	There is opportunity to build knowledge on the impact of coastal hazards on Port Stephens including long-term climate change. Monitoring will also inform adaptive management as identified in this CMP. The monitoring should consider: • measuring the impacts of climate change, • improving understanding of coastal processes and the impacts of events on the coastal zone, • tracking change or identifying trends, and • identifying if triggers for adaptive management have been reached for relevant management actions. This option is linked to option CH009, which proposes an additional CoastSnap monitoring station as part of Council's existing suite of CoastSnap locations. The CoastSnap data and analyses should form part of the monitoring program.	Alert	All	PSC	DCCEEW - EHG	Council, C&E Grants	$15,000	Year 1 and ongoing	$67,000	$685,000	3	4	6	2	2	4	14	5	14	26	Yes	Yes	Required for appropriate risk management for land use planning, asset management and other future planning. Critical knowledge building activity.
RA030	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Dutchmans Beach	PSC	NA	Council, C&E Grants	$52,500	Year 4	$3,675	$74,550	2	3	5	1	1	2	10	5	32	26	Yes	Yes	There are ongoing erosion issues at this location that require action. However, access is not a real issue and the effort should focus on erosion management.
WQ005	WQ Threat 1	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	The practices of private landholders are a key diffuse source of stormwater pollutants.	Alert	All	PSC	NA	Council, C&E Grants, Environmental Trust (Environmental education)	$30,000	Year 2 and ongoing	$0	$30,000	2	5	3	1	1	2	10	5	32	26	Yes	Yes	This is an important activity to support the community to address potential water quality issues, noting also the sensitivity of the receiving environment.
E016	RA Threat 2	Encourage local volunteer groups to support dune rehabilitation activities.	Provide direction, funding and support for community involvement in dune rehabilitation projects along the coast. Coordination of volunteers is by the Strategy and Environment team, but would be delivered by the Public Domain and Services team.	Active intervention	All	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$5,000	$50,000	2	2	3	2	2	4	9	5	37	26	Yes	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.
RA017	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location is affected by an ongoing sand deficit and would	Active intervention	Corlette	PSC	NA	Council, C&E Grants	$16,500	Year 4	$5,250	$48,000	2	4	3	1	1	2	9	5	37	26	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.

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			benefit from a more targeted action. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.																						
RA019	RA Threat 2	Access management & landscaping works.	This option relates to around 130 m length of shoreline near Danalene Parade.	Active intervention	Corlette	PSC	NA	Council, C&E Grants	$3,250	Year 6	$228	$4,160	1	3	1	1	0	1	5	5	57	26	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment and there is some vegetation protecting the foreshore (including at the narrowest points). Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, this site is not considered a high priority site by Council.
E012	RA Threat 2	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Sand management is a key issue for the study area and requires ongoing management by Council. In some locations, aeolian transport of sand is significant and can inundate recreational areas, accessways and other assets. In other locations coastal sediment transport processes (e.g. littoral drift) can result in accretion of sand in some locations and/or erosion others. Sand carting or beach scraping may be required to address these issues. At the same time, foreshore vegetation, dunes and accessways are subject to coastal erosion, an issue that may be compounded by members of the public cutting across dunes to access the beach rather than using formal accessways, resulting in loss of vegetation and further erosion. This compromises the integrity of the dunes, which function to provide protection for landward assets and also have ecosystem value. Beach accessways can become unsafe at times due to erosion (e.g. undermining) and regularly require repairs or replacement. Hence there is a need for ongoing active management of public beaches and dunes.	Active intervention	All	PSC	NA	Council, C&E Grants	$25,000	Year 1 and ongoing	$140,000	$1,425,000	4	4	7	2	2	4	15	4	9	36	Yes	Yes	There is an ongoing requirement to undertake work to protect and enhance foreshore public lands managed by Council, as well as manage the risks to public safety and the environment.
CH005	CH Threat 5	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Large areas of land along the Tilligerry Peninsula are subject to coastal inundation in the present day, a risk that will increase in future. In addition, the low-lying land of the peninsula is also at risk from permanent tidal inundation. This has implications for the overarching approach for managing risk from all coastal and flood hazards.	Planning for change	All	PSC	DCCEEW - EHG, Utilities (e.g. HWC), TfNSW, NPWS, DPHI - Crown Lands, Worimi LALC	Council, C&E Grants	$200,000	Year 6-7	$0	$200,000	3	3	7	1	1	2	12	4	19	36	Yes	Yes	Necessary Strategy for future planning and adaptation to climate change.
E001	BD Threat 2	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing	These plans have been developed by Hunter LLS and provide for coordinated pest and weed control by the relevant stakeholders. Biosecurity was identified as a key threat to coastal biodiversity.	Active intervention	All	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$25,000	$250,000	3	2	6	2	2	4	12	4	19	36	Yes	Yes	

Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
		program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.																							
RA034	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Nelson Bay Beach	PSC	NA	Council, C&E Grants	$114,000	Year 4	$7,000	$156,000	3	3	6	2	1	3	12	4	19	36	Yes	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.
E002	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Informal access through the dunes is negatively impacting vegetation and the dune system in several locations along the beach. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	One Mile Beach	PSC	NA	Council, C&E Grants	$197,000	Year 3 and ongoing	$8,750	$258,250	3	3	6	1	1	2	11	4	28	36	Yes	Yes	There are ongoing issues at this location that need action as a priority. The key area is around the SLSC. There is risk to the road from dune movement.
E011	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Fingal Bay	PSC	NA	Council, C&E Grants	$197,000	Year 4	$8,750	$249,500	3	3	6	1	1	2	11	4	28	36	No	Yes	There are ongoing key issues at this location that require action as a stand-alone option.
RA027	RA Threat 2	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Salamander Bay	PSC	NA	Council, C&E Grants	$50,000	Year 5	$3,500	$67,500	2	4	2	1	1	2	8	4	45	36	Yes	Yes	This location is highly valued by the community.
RA031	CH Threat 1	Repair or replace stairs and fix fencing to reinstate public access from the car park.	There have been concerns raised by the community regarding the length of time these stairs have been closed. They were closed and barricaded following erosion sufficient to render the stairs inaccessible and a safety risk.	Active intervention	Dutchmans Beach	PSC	NA	Council, C&E Grants	$10,000	Year 1	$2,000	$28,000	2	0	4	2	2	4	8	4	45	36	Yes	Yes	This location is highly valued by the community.
CH077	CH Threat 1	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	This action has been included to assist Council in undertaking the preparatory activities required to facilitate implementation of the CZEAS, if triggered. It is assumed that these approvals, permits and licences would be in place for a maximum of five years, and therefore would require re-application or renewal during the 10 year period of implementation.	Emergency response	All	PSC	NA	Council	$50,000	Year 1 and Year 6	$0	$100,000	2	1	2	2	2	4	7	4	47	36	Yes	Yes	
WQ008	WQ Threat 1	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Studies have shown dog faeces is a material source of faecal contamination in coastal waters. Stakeholders identified that off-leash dogs can disturb other recreational users and can have a material impact on migratory waders and shorebirds. Reference should also be made to Option WQ005, which provides for community education.	Active intervention	All	PSC	NA	Council	$20,000	Year 2	$0	$20,000	2	2	3	1	1	2	7	4	47	36	No	Yes	This option supports Council's ongoing operations.
RA045	CH Threat 7	Dredging to improve access to the boat ramp and Soldiers Point marina.	Naturally occurring sediment transport processes can result in the accretion of sand in navigational areas, limiting access to boat ramps or marinas. This action provides for maintenance dredging to address this issue.	Active intervention	Little Beach, Nelson Bay, Soldiers Point,	PSC	NA	Council	$174,500	Year 1 and ongoing (as reuqired)	$50,611	$630,000	1	3	1	1	0		4	4	62	36	No	Yes	

Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
					Taylors Beach																				
CH007	CH Threat 3	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Dune transgression was identified as a key threat to natural, cultural and built assets along Stockton Beach. Dune management for coastal hazard protection.	Active intervention	Stockton Sand Dunes	PSC	WCLB	WCLB, Council & C&E Grants, NSW Environmental Trust (e.g. Environmental Research / Restoration and Rehabilitation), CoastCare Grants	$510,000	Year 2	$102,000	$1,326,000	4	2	6	2	2	4	12	3	19	47	Yes	Yes	Requires confirmation by WCLB prior to inclusion in CMP.
CH079	CH Threat 3	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	The aeolian transport of sand into the car park and other facilities at Birubi Point is an ongoing issue. This action proposes to undertake dune stabilisation works to facilitate the accretion and capture of sand, including barrier dune reformation, fencing and revegetation.	Active intervention	Birubi Point	PSC	NA	Council, C&E Grants	$100,000	Year 2	$20,000	$260,000	3	2	4	2	2	4	10	3	32	47	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
E004	BD Threat 2	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	The Mambo Wetlands comprises a large area of Coastal Wetland. This option supports the ongoing management of this important area. When the current PoM is updated as per management action E018 (and any findings or recommendations arising from actions E008 and CH029), this management action would support implementation of the updated PoM.	Active intervention	Mambo Wetlands	PSC	NA	Council, C&E Grants	$0	Year 1 and ongoing	$12,000	$120,000	3	2	4	2	2	4	10	3	32	47	Yes	Yes	
HE002	BD Threat 2	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	This important site benefits from a co-management approach.	Active intervention	Soldiers Point	PSC	NA	Council, C&E Grants	$15,000	Year 1 and ongoing	$15,000	$150,000	3	2	4	2	2	4	10	3	32	47	Yes	Yes	
CH002	All CH Threats	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	This action will provide for the ongoing monitoring of Council's coastal structures as part of their asset management system. The monitoring framework will in the first instance require a survey to establish the baseline condition of existing structures, building on the survey undertaken for Stage 2, the BMT (2021b) Coastal Structures Audit. The outcomes of the	Alert	All	PSC	NA	Council	$0	Year 1 and ongoing	$24,000	$240,000	3	3	3	1	2	3	9	3	37	47	Yes	Yes	This activity is a critical asset management activity, to understand which structures require maintenance or may in future require an upgrade.

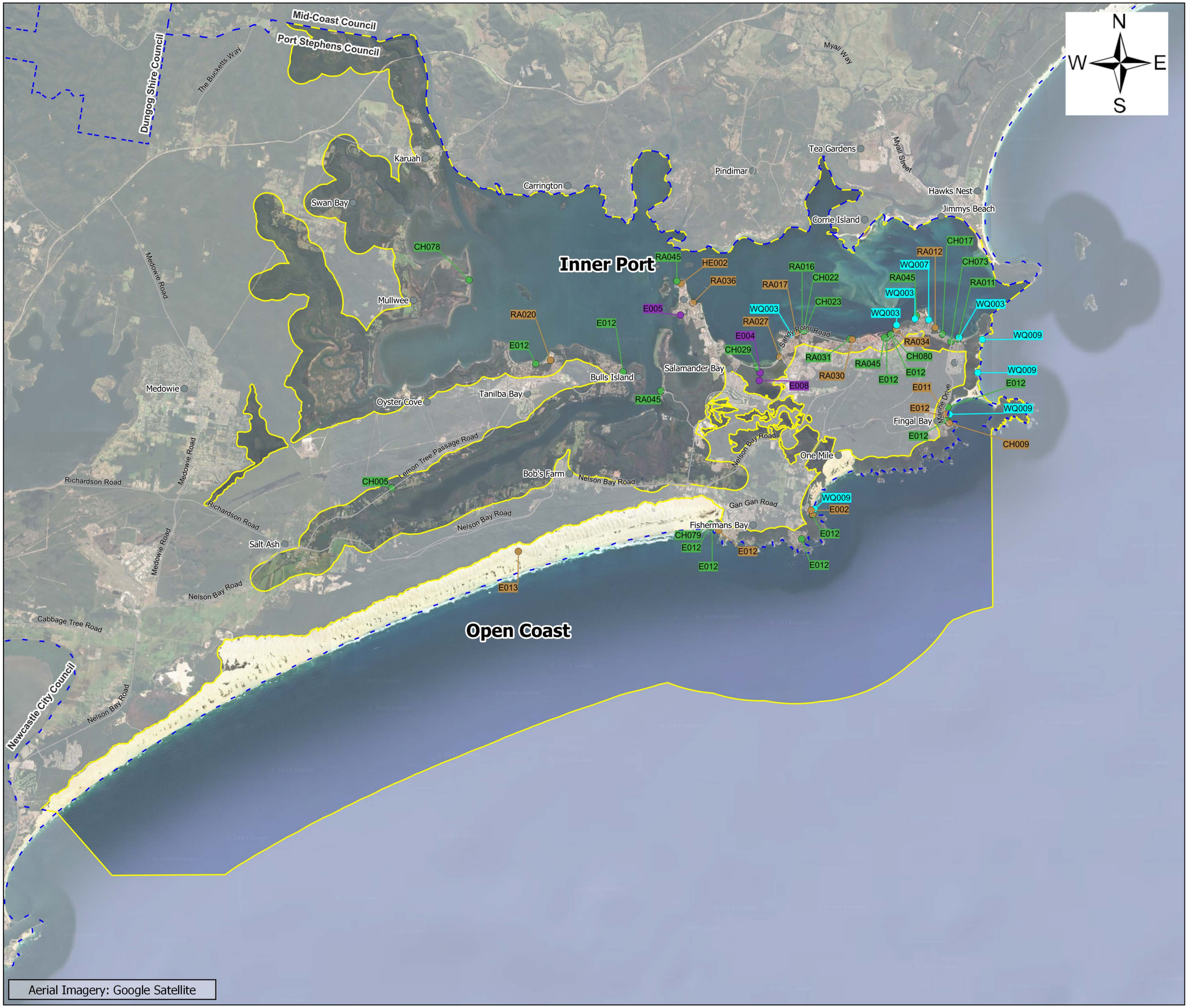
Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
			monitoring could be used to inform any remedial or maintenance works required for the structures.																						
CH012	CH Threats 4 and 5	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from tidal inundation aimed at the ongoing provision of access for the community in future.	The coastal hazard study identified that several local roads are inundated in the present day due to coastal inundation. Some of these roads provide the only emergency access and egress to parts of the LGA.	Planning for change	All	PSC	TfNSW	Council, C&E Grants, Floodplain Management Grants	$200,000	Year 1 to 3	$0	$200,000	3	2	3	2	2	4	9	3	37	47	Yes	Yes	Necessary to address future risk to roads. Links to some of the adaptation plans (CH005, CH029, CH073).
RA020	CH Threat 1	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	The intent of this option is to undertake landscaping to assist in bank stabilisation. Where necessary some geotextile matting or coir logs may be placed to assist bank stabilisation. The extent of foreshore proposed for landscaping works is around 110 m long.	Active intervention	Tanilba	PSC	NA	Council, C&E Grants	$41,750	Year 6	$2,950	$53,550	2	3	1	1	1	2	6	3	51	47	Yes	Yes	
WQ007	WQ Threat 4	Undertake an investigation to identify wastewater pump stations in the Port Stephens catchment that require upgrading as part of a broader wastewater pump station improvement program that will reduce the risk of wastewater overflows by providing additional emergency storage at selected sites.	The community has expressed concern about the risk of overflows from the wastewater pump station in Shoal Bay. However, HWC advised that addressing this risk is part of a broader program and has committed to undertaking the initial investigation to scope the improvements that might be required (if any) at this site and others in the catchment.	Active intervention	Port Stephens	HWC	NA	HWC	$100,000	Year 1	$0	$100,000	2	1	3	1	1	2	6	3	51	47	Yes	Yes	
RA043	RA Threat 2	Undertake fencing and landscaping works to stabilise the foreshore .	The intent of the works would be to construct some fencing to control public access between the shoreline and the water and to implement landscaping works to facilitate bank stabilisation over a length of shoreline of about 550 m.	Active intervention	Lemon Tree Passage	PSC	NA	Council, C&E Grants	$13,750	Year 5	$963	$18,563	2	2	2	1	0	1	5	3	57	47	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, this site is not considered a high priority site by Council.
CH075	CH Threat 7	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	It is recommended that a catchment balance assessment be undertaken to ensure the balance between catchment flows and tidal inundation risk is considered. The works would then be prioritised on a risk basis considering adjacent land use, history of issues/complaints and the potential reductions in economic damages arising from alleviation of the associated nuisance flooding.	Active intervention	All	PSC	NA	Council, C&E Grants	$175,000	Year 3	$0	$175,000	3	1	3	1	2	3	7	2	47	56	Yes	Yes	
CH081	CH Threat 4	Install tide gates/flaps on priority stormwater outlets.	This option provides for implementation of priority works identified under option CH075 at up to 20 sites.	Active intervention	All	PSC	NA	Council, C&E Grants	$135,000	Year 4 and ongoing	$60,000	$435,000	3	2	2	1	1	2	6	2	51	56	Yes	Yes	
RA010	CH Threat 2	Beach nourishment for improved beach access and amenity.	The general westward trend of sand transport in Shoal Bay leads to a reduction in beach width and volume. This option proposes nourishment to increase beach volume for improved access and amenity for this popular beach. It provides a comparison with sand carting, which is Council's historic approach to managing this issue.	Active intervention	Shoal Bay	PSC	NA	Council, C&E Grants	$2,862,500	Year 2	$0	$2,862,500	4	0	4	1	1	2	6	2	51	56	No	No	Council has determined to not proceed with this option in the current CMP due to the high cost and uncertainty around the planning approvals.
RA036	RA Threat 2	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	The community is concerned about the ongoing erosion at this location. The proposed works would involve some minor re-profiling to create a shoreline profile similar to the nearby beach, with additional stabilisation provided by geotextile or jute meshing and coir logs, as required. Landscaping would be used to both stabilise the shoreline and control public access.	Active intervention	Kangaroo Point	PSC	NA	Council, C&E Grants	$233,000	Year 7	$21,875	$298,625	3	1	4	1	0	1	6	2	51	56	Yes	Yes	There is an existing study that examines the processes that are causing erosion at this location. There are Hunter Water

Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
																									assets in this location that also need protection
CH017	CH Threat 1	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Shoal Bay Road is the sole access for Shoal Bay and Fingal Bay. The section of the road east of Beach Road is close to the shoreline. In the absence of erosion hazard lines for the Outer Port, the extent and timing of coastal erosion risk to the road is unknown. This option proposes a coastal erosion risk assessment and, if required, an assessment of feasible options to protect the road.	Planning for change	Shoal Bay	PSC	NA	Council, C&E Grants	$200,000	Year 2 to 3	$0	$200,000	3	1	0	2	2	4	5	2	57	56	No	Yes	Concerns around future risk to this road based on previous experience of emergency works in the past. Critical road to the Tomaree area. To be undertaken concurrently with the adaptation plan (CH073).
CH078	CH Threat 1	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	This action applies to part of the Swan Bay seawall that is failing and requires toe protection works to ensure its ongoing functionality. In addition to the coastal inundation risk at this location, the structure is retaining land that is filled with building waste. A clean out of the stormwater outlet is also required. The seawall is adjacent to Waterfront Road, which is a Crown Road managed by Council.	Active intervention	Swan Bay	PSC	DPHI - Crown Lands	Council	$304,000	Year 3	$15,000	$409,000	3	2	2	1	0	1	5	2	57	56	Yes	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.
RA016	CH Threat 2	Sand carting to provide improved beach access and amenity.	Sand carting and beach nourishment activities have previously been undertaken at Conroy Park. The ongoing sand deficit at this location results in reduction in beach volume/width. This option has been developed based on Priority Action 1 from the Management Plan for Sandy Point/Conroy Park (Whitehead and Assoc, 2015). While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Sandy Point / Conroy Park	PSC	NA	Council, C&E Grants	$122,500	Year 3	$10,000	$192,500	3	0	2	1	2	3	5	2	57	56	No	Yes	This option is critical to the use and protection of this area, which is highly valued by the community.
CH080	CH Threat 1	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	This action is proposing design and investigation of a permanent solution to the ongoing coastal erosion issue at this location.	Active intervention	Nelson Bay Beach	PSC	DPHI - Crown Lands	Council, C&E Grants	$87,000	Year 1	$0	$87,000	2	2	0	1	1	2	4	2	62	56	No	Yes	Council requested addition of this option to address ongoing erosion issues in this location.
RA041	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 1,150 m.	Active intervention	Lemon Tree Passage	PSC	NA	Council, C&E Grants	$28,750	Year 6	$2,013	$36,800	2	3	1	0	0	0	4	2	62	56	No	No	On review of the site conditions and use of the location, it is considered that there is no material issue with public access impacting the environment. Further, based on relatively low intensity of usage comparable with other locations in the coastal zone, and noting also the width of public land at this location to accommodate cycles of erosion and accretion, this site is not considered a high priority site by Council.
RA038	RA Threat 2	Access management & landscaping works.	The intent of the works would be to use landscaping works to aid dune stabilisation and control public access over a length of shoreline of about 480 m.	Active intervention	Soldiers Point	PSC	NA	Council, C&E Grants	$24,000	Year 7	$1,680	$29,040	2	2	1	0	0	0	3	2	67	56	No	No	While there is opportunity to provide native vegetation for habitat value and dune stabilisation, the location is subject to lower intensity usage and has limited space available. It is not considered a high priority site by Council.

Option ID	Key Threat Addressed	Management Option - Name	Supporting Statement	Type of Option	Location	Lead Agency	Partners	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Likely Community Support	Council & Stakeholder Support	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Rank by Total Score	Rank by Score Adjusted for Cost	No regrets option?	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.
CH022	CH Threat 1	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	At present the absence of erosion hazard mapping in the Outer Port precludes a distribution analysis to allocate costs to public and private beneficiaries of coastal protection works. This option proposes progressing previously identified options for Sandy Point so that they can be progressed promptly to implementation through the economic analyses and grant application process for co-funding by the State, PSC and benefitting individuals.	Active intervention	Sandy Point	PSC	DPHI - Crown Lands	Council, C&E Grants	$285,000	Year 6-7	$0	$285,000	3	2	1	1	0	1	4	1	62	66	No	Yes	Critical to address the ongoing issues within this area. This enables Council to have a 'shovel ready' option for when the next CMP is prepared to enable prompt implementation (pending a CBA and acceptance of proposed funding with identified beneficiaries).
CH023	CH Threat 1	Undertake maintenance works / repairs to the existing rock revetment.	An audit of coastal structures undertaken by BMT (2021) concluded the existing foreshore protection measures at Sandy Point require significant repairs and modifications to achieve functionality. This option proposes maintenance works in the form of toe protection works to improve the functionality of the existing structure on the eastern shoreline of Sandy Point. It is noted the structure is an abandoned asset.	Active intervention	Sandy Point	PSC	DPHI - Crown Lands	Council	$1,156,500	Year 2	$16,500	$1,305,000	4	1	1	0	1	1	3	1	66	66	No	Yes	Critical to the protection of this area. Ongoing issues within this area due to historical protection works. Maintenance of existing rock revetment.

Appendix G

Options Recommended for the CMP



PORT STEPHENS COUNCIL

RG-00-11

Port Stephens Coastal Management Program

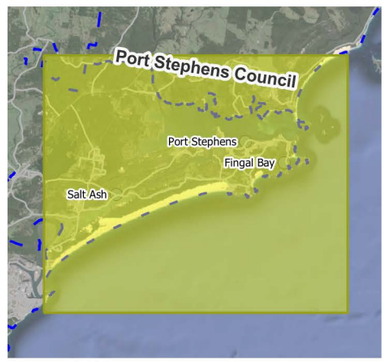
Port Stephens CMP Options Study Area

Legend

- LGA Boundary
- Study Area

Threat Options

- Biodiversity Threat
- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat



Job Number: J1702
Scale : 1:130000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

RA045 - Coastal Hazard Threat

HE002 - Recreational Activity Threat

Soldiers Point

RA036 - Recreational Activity Threat

Soldiers Point Road

E005 - Biodiversity Threat

Aerial Imagery: Google Satellite

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PORT STEPHENS COUNCIL

RG-00-11-A

Port Stephens Coastal Management Program

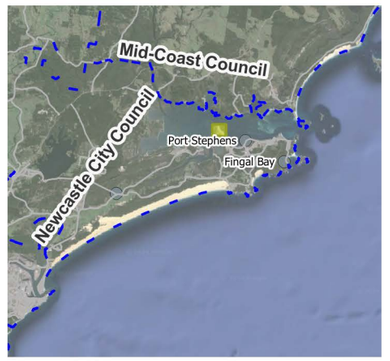
Kangaroo Point and Soldiers Point

Legend

- LGA Boundary
- Study Area

Threat Options

- Biodiversity Threat
- Coastal Hazard Threat
- Recreational Activity Threat



Job Number: J1702
Scale : 1:6000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

N
W E
S

RA027 - Recreational Activity Threat

CH029 - Coastal Hazard Threat

E004 - Biodiversity Threat

E008 - Biodiversity Threat

Soldiers Point Road

Sandy Point Road

Foreshore Drive

Salamander Bay

Port Stephens Drive

Soldiers Point Drive

Port Stephens Drive

Salamander Way

Salamander Way

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-B

Port Stephens Coastal Management Program

Mambo Wetlands, Roy Wood Reserve and Salamander Bay

Legend

- LGA Boundary
- Study Area

Threat Options

- Biodiversity Threat
- Coastal Hazard Threat
- Recreational Activity Threat

Job Number: J1702
Scale : 1:8000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

PORT STEPHENS COUNCIL

RG-00-11-C

Port Stephens Coastal Management Program

Corlette and Sandy Point

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

PORT STEPHENS COUNCIL

RG-00-11-D

Port Stephens Coastal Management Program

Dutchmans Beach

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

WQ003 - Water Quality Threat

RA034 - Recreational Activity Threat

CH080 - Coastal Hazard Threat

E012 - Coastal Hazard Threat

RA045 - Coastal Hazard Threat

E012 - Coastal Hazard Threat

Shoal Bay Road

Victoria Parade

Government Road

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-E

Port Stephens Coastal Management Program

Nelson Bay

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

Rhelm

PORT STEPHENS COUNCIL

RG-00-11-F

Port Stephens Coastal Management Program

Box Beach, Little Beach, Shoal Bay and Zenith Beach

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

Job Number: J1702
Scale : 1:10000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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E012 - Coastal Hazard Threat

E011 - Recreational Activity Threat

WQ009 - Water Quality Threat

Marine Drive

E012 - Recreational Activity Threat

Fingal Bay

E012 - Coastal Hazard Threat

CH009 - Recreational Activity Threat

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-G

Port Stephens Coastal Management Program

Fingal Bay

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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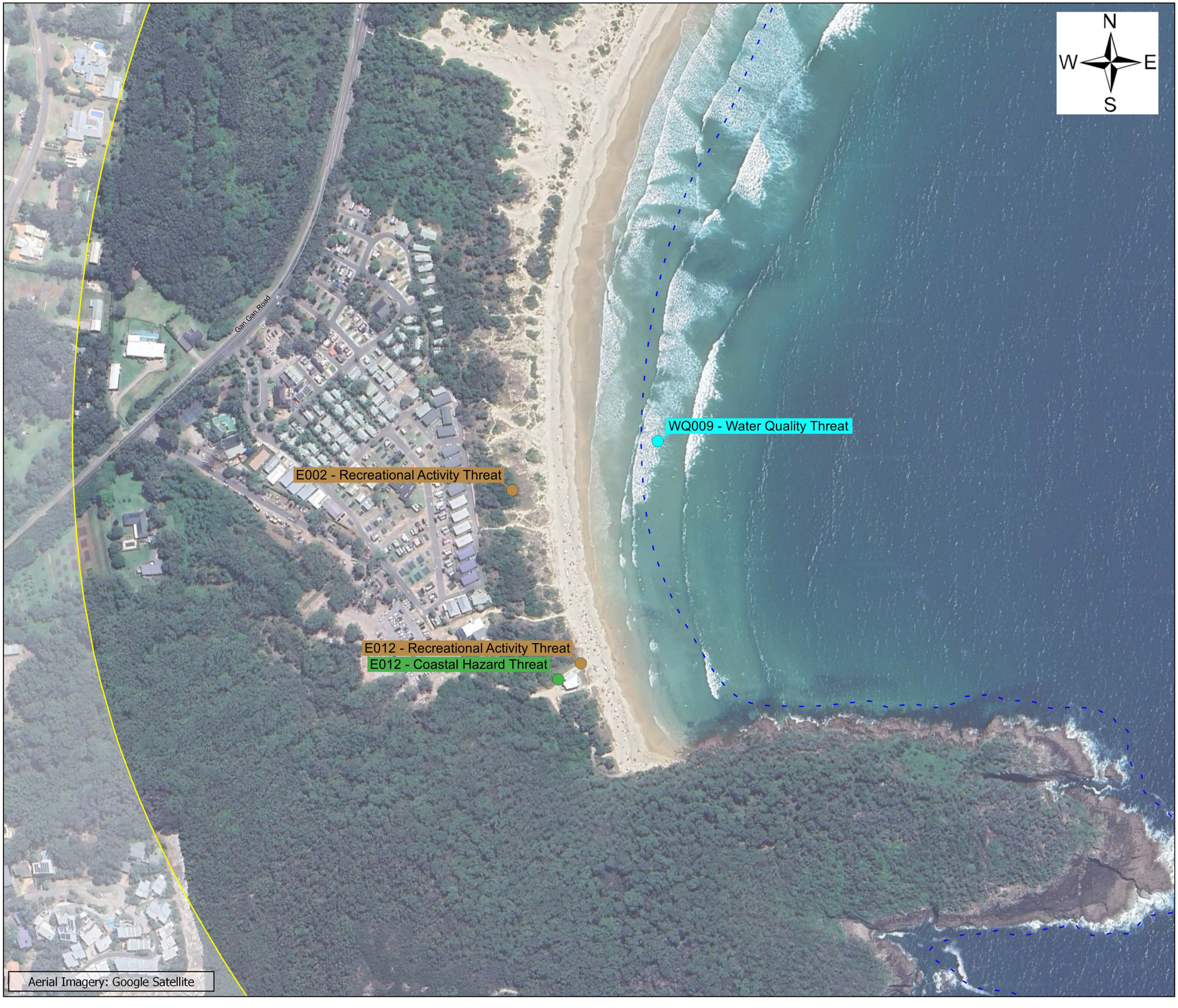

PORT STEPHENS COUNCIL

RG-00-11-H

Port Stephens Coastal Management Program

Boat Harbour Beach and One Mile Beach

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat
- Water Quality Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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E012 - Coastal Hazard Threat

CH079 - Coastal Hazard Threat

E012 - Coastal Hazard Threat

E012 - Recreational Activity Threat

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-I

Port Stephens Coastal Management Program

Birubi Point

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat

Job Number: J1702
Scale : 1:3000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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RA020 - Recreational Activity Threat

E012 - Coastal Hazard Threat

E012 - Coastal Hazard Threat

Meredith Avenue

Bulls Island

Lemon Tree Passage Road

RA045 - Coastal Hazard Threat

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-J

Port Stephens Coastal Management Program

Tanilba Bay, Swan Bay, and Lemon Tree Passage

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat

Job Number: J1702
Scale : 1:15000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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Lemon Tree Passage Road

CH005 - Coastal Hazard Threat

Bob's Farm

Nelson Bay Road

Nelson Bay Road

E013 - Recreational Activity Threat

Aerial Imagery: Google Satellite

PORT STEPHENS COUNCIL

RG-00-11-K

Port Stephens Coastal Management Program

Anna Bay, Stockton Beach and Tilligerry Peninsula

Legend

- LGA Boundary
- Study Area

Threat Options

- Coastal Hazard Threat
- Recreational Activity Threat

Job Number: J1702
Scale : 1:30000@A3
Date : 21/02/2024
Revision : 02
Created by : SJW
Coordinate System :
GDA2020 / MGA zone 56

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Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option - Name	Supporting Statement	Type of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Lead Agency	Partners	Responsible Area of Council	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.	No regrets option?
CH001	All CH Threats	Y	Y	Y	Y	Y	Coastal hazard monitoring strategy.	There is opportunity to build knowledge on the impact of coastal hazards on Port Stephens including long-term climate change. Monitoring will also inform adaptive management as identified in this CMP. The monitoring should consider: • measuring the impacts of climate change, • improving understanding of coastal processes and the impacts of events on the coastal zone, • tracking change or identifying trends, and • identifying if triggers for adaptive management have been reached for relevant management actions. This option is linked to option CH009, which proposes an additional CoastSnap monitoring station as part of Council's existing suite of CoastSnap locations. The CoastSnap data and analyses should form part of the monitoring program.	Alert	All	See detailed option summary in Section 3.4.2 of the CMP	High	Extreme	PSC	DCCEEW - EHG	Assets	Council, C&E Grants	$ 15,000	Year 1 and ongoing	$ 67,000	$ 685,000	3	4	6	4	14	5	Yes	Required for appropriate risk management for land use planning, asset management and other future planning. Critical knowledge building activity.	Yes
CH002	All CH Threats	Y			Y	Y	Develop and implement a program for monitoring the condition of coastal structures owned and/or maintained by Council.	This action will provide for the ongoing monitoring of Council's coastal structures as part of their asset management system. The monitoring framework will in the first instance require a survey to establish the baseline condition of existing structures, building on the survey undertaken for Stage 2, the BMT (2021b) Coastal Structures Audit. The outcomes of the monitoring could be used to inform any remedial or maintenance works required for the structures.	Alert	All		High	Extreme	PSC	NA	Assets	Council	$ -	Year 1 and ongoing	$ 24,000	$ 240,000	3	3	3	3	9	3	Yes	This activity is a critical asset management activity, to understand which structures require maintenance or may in future require an upgrade.	Yes
CH003	All CH Threats	Y	Y	Y	Y	Y	For those Aboriginal cultural heritage sites and Aboriginal Places located on Council land or Crown land for which Council is the Reserve Manager, work with Traditional Owners to evaluate the level of risk and develop a plan to manage the impacts to cultural heritage from coastal hazards, including sea level rise.	A similar study is currently underway for the Worimi Conservation Lands and this study proposes to evaluate risk to sites located on Council land and Crown land managed by Council.	Planning for change	All		High	Extreme	PSC	NA	Strategy & Environment	Council, C&E Grants, Aboriginal Cultural Heritage Grants, NSW Environmental Trust (Protecting our Places)	$ 175,000	Year 4	$ -	$ 175,000	3	4	7	4	15	5	Yes		Yes
CH005	CH Threat 5	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Tilligerry Peninsula in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Large areas of land along the Tilligerry Peninsula are subject to coastal inundation in the present day, a risk that will increase in future. In addition, the low-lying land of the peninsula is also at risk from permanent tidal inundation. This has implications for the overarching approach for managing risk from all coastal and flood hazards.	Planning for change	All		Low	Extreme	PSC	DCCEEW - EHG, Utilities (e.g. HWC), TfNSW, NPWS, DPHI - Crown Lands, Worimi LALC	Strategy & Environment / Assets	Council, C&E Grants	$ 200,000	Year 6-7	$ -	$ 200,000	3	3	7	2	12	4	Yes	Necessary Strategy for future planning and adaptation to climate change.	Yes

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option - Name	Supporting Statement	Type of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Lead Agency	Partners	Responsible Area of Council	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.	No regrets option?
CH007	CH Threat 3	Y			Y	Y	Undertake works to stabilise the foredune in accordance with the *NSW Coastal Dune Management Manual* (DLWC, 2001).	Dune transgression was identified as a key threat to natural, cultural and built assets along Stockton Beach. Dune management for coastal hazard protection.	Active intervention	Stockton Sand Dunes		Medium	High	PSC	WCLB	Strategy & Environment	WCLB, Council & C&E Grants, NSW Environmental Trust (e.g. Environmental Research / Restoration and Rehabilitation), CoastCare Grants	$ 510,000	Year 2	$ 102,000.00	$ 1,326,000.00	4	2	6	4	12	3	Yes	Requires confirmation by WCLB prior to inclusion in CMP.	Yes
CH009	CH Threat 2	Y	Y	Y	Y	Y	Install additional Coast Snap monitoring point at Fingal Beach.	Coast Snap monitoring points provide valuable data about shoreline changes over time. There are already official CoastSnap points at Shoal Bay, Nelson Bay and Birubi Point.	Active intervention	Fingal Bay		Medium	Extreme	PSC	DCCEEW - EHG	Strategy & Environment	Council, C&E Grants	$ 11,800	Year 2	$ 7,000	$ 74,800	2	4	9	4	17	9	Yes	This would be a useful addition to the CoastSnap network in Port Stephens to assist with management of this popular beach.	Yes
CH011	All CH Threats	Y	Y	Y	Y	Y	Prepare a planning proposal to incorporate provisions to manage the risk to life and properties from coastal hazards for inclusion in the Port Stephens LEP 2013 and update the DCP 2014 accordingly.	To provide mitigation of risk to life and property arising from coastal hazards for existing and proposed development.	Planning for change	All		High	Extreme	PSC	NA	Development & Compliance	Council	$ -	Year 1	$ -	$ -	1	4	7	3	14	14	Yes	Required for future land use planning.	Yes
CH012	CH Threats 4 and 5	Y	Y	Y	Y	Y	Document a long-term strategy for local and regional roads under the care and control of Council that are key access roads at risk from tidal inundation aimed at the ongoing provision of access for the community in future.	The coastal hazard study identified that several local roads are inundated in the present day due to coastal inundation. Some of these roads provide the only emergency access and egress to parts of the LGA.	Planning for change	All		High	Extreme	PSC	TfNSW	Assets	Council, C&E Grants, Floodplain Management Grants	$ 200,000	Year 1 to 3	$ -	$ 200,000	3	2	3	4	9	3	Yes	Necessary to address future risk to roads. Links to some of the adaptation plans (CH005, CH029, CH073).	Yes
CH017	CH Threat 1	Y			Y	Y	New seawall to mitigate coastal erosion risk to Shoal Bay Road.	Shoal Bay Road is the sole access for Shoal Bay and Fingal Bay. The section of the road east of Beach Road is close to the shoreline. In the absence of erosion hazard lines for the Outer Port, the extent and timing of coastal erosion risk to the road is unknown. This option proposes a coastal erosion risk assessment and, if required, an assessment of feasible options to protect the road.	Planning for change	Shoal Bay	Shoal Bay Beach	Medium	High	PSC	NA	Assets	Council, C&E Grants	$ 200,000	Year 2 to 3	$ -	$ 200,000	3	1	0	4	5	2	Yes	Concerns around future risk to this road based on previous experience of emergency works in the past. Critical road to the Tomaree area. To be undertaken concurrently with the adaptation plan (CH073).	No

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option - Name	Supporting Statement	Type of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Lead Agency	Partners	Responsible Area of Council	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.	No regrets option?
CH022	CH Threat 1	Y			Y	Y	Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.	At present the absence of erosion hazard mapping in the Outer Port precludes a distribution analysis to allocate costs to public and private beneficiaries of coastal protection works. This option proposes progressing previously identified options for Sandy Point so that they can be progressed promptly to implementation through the economic analyses and grant application process for co-funding by the State, PSC and benefitting individuals.	Active intervention	Sandy Point	Sandy Point	Medium	High	PSC	DPHI - Crown Lands	Assets	Council, C&E Grants	$ 285,000	Year 6-7	$ -	$ 285,000	3	2	1	1	4	1	Yes	Critical to address the ongoing issues within this area. This enables Council to have a 'shovel ready' option for when the next CMP is prepared to enable prompt implementation (pending a CBA and acceptance of proposed funding with identified beneficiaries).	No
CH023	CH Threat 1	Y			Y	Y	Undertake maintenance works / repairs to the existing rock revetment.	An audit of coastal structures undertaken by BMT (2021) concluded the existing foreshore protection measures at Sandy Point require significant repairs and modifications to achieve functionality. This option proposes maintenance works in the form of toe protection works to improve the functionality of the existing structure on the eastern shoreline of Sandy Point. It is noted the structure is an abandoned asset.	Active intervention	Sandy Point	Eastern shoreline of Sandy Point	Medium	High	PSC	DPHI - Crown Lands	Capital Works	Council	$ 1,156,500	Year 2	$ 16,500	$ 1,305,000	4	1	1	1	3	1	Yes	Critical to the protection of this area. Ongoing issues within this area due to historical protection works. Maintenance of existing rock revetment.	No
CH029	CH Threat 5	Y	Y		Y	Y	Prepare a climate change adaptation strategy for the Foreshore Drive locality in consultation with the local community and key stakeholders. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action.	Following a recent coastal storm that damaged the road, Foreshore Drive was closed until such time as Council constructed a new bridge. It is apparent the risk to natural and built assets at this location will increase under climate change conditions. The protection of Mambo wetlands is an important issue for the community and needs special consideration, to include a water balance and hydrological study.	Planning for change	Salamander Bay		Low	Extreme	PSC	NA	Strategy & Environment / Assets	Council, C&E Grants	$ 200,000	Year 5 to 6	$ -	$ 200,000	3	3	9	4	16	5	Yes	Critical to address future risk from climate change and how the community and Council will adapt.	Yes
CH072	CH Threats 1 and 2	Y	Y	Y	Y	Y	Undertake a coastal erosion hazard investigation for the Inner and Outer Port.	The erosion hazard mapping prepared in Stage 2 of the CMP only covered the open coast. The lack of erosion hazard mapping in the Inner and Outer Port means that there is a lack of information about the potential risk from shoreline erosion and how the risk will change over time. The lack of erosion hazard lines also means that it is not possible to undertake distribution analyses to identify beneficiaries of coastal protection works in the Inner and Outer Port and therefore any such works would not be eligible for funding under the C&E Grants program. It is noted that this would result in the need to review the adequacy of the new provisions of the LEP and DCP relating to coastal hazards developed under management action CH011 and updates to these provisions may be required at that time. The coastal risk planning mapping would also require updating to incorporate the new hazard extents.	Alert	Inner Port Outer Port		Medium	Extreme	PSC	DCCEEW - EHG	Strategy & Environment	Council, C&E Grants	$ 350,000	Year 1 to 2	$ -	$ 350,000	3	2	10	4	16	5	Yes	This is a critical activity to enable future planning and support future CMPs.	Yes

Option ID	Key Threat Addressed	Coastal Vulnerability Area	Coastal Wetland Area	Littoral Rainforest Area	Coastal Use Area	Coastal Environment Area	Management Option - Name	Supporting Statement	Type of Option	Location	Location description	Present Day Risk (2023)	Future Risk (2120)	Lead Agency	Partners	Responsible Area of Council	Source of Funding	Capital Cost	Timing	Recurrent Annual Cost	Total Cost for CMP Over 10 Years	Cost Score	Threat Mitigation Score	Objectives Score	Preliminary Acceptability Score	Total Score	Score Adjusted for Cost	Include in CMP?	Reason for inclusion (or exclusion) from the CMP.	No regrets option?
CH073	All CH Threats	Y			Y	Y	Develop a climate change adaptation strategy for the Shoal Bay precinct.	The adaptation plan should aim to develop a more detailed understanding of the existing and future risk from coastal hazards to natural and built assets and infrastructure in Shoal Bay which can then be discussed with the stakeholders with respect to the key attributes and activities undertaken in Shoal Bay that the community would like to maintain into the future and under climate change conditions. One key issue that has been identified to date is the risk to Shoal Bay Road from coastal hazards - it is the only road servicing this locality. The output of the plan will be an agreed and costed adaptation pathway.	Planning for change	Shoal Bay		High	Extreme	PSC	DCCEEW - EHG, Utilities (e.g. HWC), NPWS, DPHI - Crown Lands	Strategy & Environment	Council, C&E Grants	$ 200,000	Year 2-3	$ -	$ 200,000	3	4	11	4	19	6	Yes	Critical to future planning of the area, which is highly valued area for community and tourists. Implement concurrently with Option CH017.	Yes
CH074	RA Threat 2	Y	Y	Y	Y	Y	Develop a policy to articulate Council's position regarding the protection of private land along estuarine foreshores and the prioritisation of public funds for the protection of public land, public access and recreational amenity.	Some owners of foreshore properties are of the understanding that Council will be wholly responsible for the protection of foreshore land from coastal hazards. Consistent with the State Government policy, Council wishes to make clear that their priority is the protection of public land and assets. Further, the community members have identified that equity and prioritisation of public benefit is important to them. In addition, there is an expectation that Council will maintain existing works, whether or not they are owned by Council. Council wishes to clarify that they are only responsible for maintenance of seawalls for which they are the identified owner or responsible party (e.g. under a Crown lands licence).	Planning for change	All		Medium	High	PSC	NA	Strategy & Environment	Council, C&E Grants	$ 25,000	Year 2	$ -	$ 25,000	2	2	7	3	12	6	Yes	Council lack an existing policy. Hence, the option is necessary to address the community's expectations and clearly communicate Council's position.	Yes
CH075	CH Threat 7	Y	Y		Y	Y	Investigate risk of tidal ingress of stormwater outlets and identify outlets requiring tide gates.	It is recommended that a catchment balance assessment be undertaken to ensure the balance between catchment flows and tidal inundation risk is considered. The works would then be prioritised on a risk basis considering adjacent land use, history of issues/complaints and the potential reductions in economic damages arising from alleviation of the associated nuisance flooding.	Active intervention	All		High	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 175,000	Year 3	$ -	$ 175,000	3	1	3	3	7	2	Yes		Yes
CH077	CH Threat 1		Y		Y	Y	Prepare for activation of the CZEAS by obtaining the necessary planning approvals, permits and licences.	This action has been included to assist Council in undertaking the preparatory activities required to facilitate implementation of the CZEAS, if triggered. It is assumed that these approvals, permits and licences would be in place for a maximum of five years, and therefore would require re-application or renewal during the 10 year period of implementation.	Emergency response	All		Medium	High	PSC	NA	Public Domain & Services	Council	$ 50,000	Year 1 and Year 6	$ -	$ 100,000	2	1	2	4	7	4	Yes		Yes
CH078	CH Threat 1	Y			Y	Y	Undertake maintenance works / repairs to the existing seawall and clean out stormwater outlet.	This action applies to part of the Swan Bay seawall that is failing and requires toe protection works to ensure its ongoing functionality. In addition to the coastal inundation risk at this location, the structure is retaining land that is filled with building waste. A clean out of the stormwater outlet is also required. The seawall is adjacent to Waterfront Road, which is a Crown Road managed by Council.	Active intervention	Swan Bay	Approx. 340 m of seawall adjacent to 83 Waterfront Road.	Medium	High	PSC	DPHI - Crown Lands	Assets	Council	$ 304,000	Year 3	$ 15,000	$ 409,000	3	2	2	1	5	2	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.	Yes
CH079	CH Threat 3	Y			Y	Y	Undertake dune stabilisation works at Birubi Point in accordance with the NSW Coastal Dune Management Manual (DLWC, 2001).	The aeolian transport of sand into the car park and other facilities at Birubi Point is an ongoing issue. This action proposes to undertake dune stabilisation works to facilitate the accretion and capture of sand, including barrier dune reformation, fencing and revegetation.	Active intervention	Birubi Point		Medium	High	PSC	NA		Council, C&E Grants	$ 100,000	Year 2	$ 20,000	$ 260,000	3	2	4	4	10	3	Yes	Council requested that this option be included as a stand-alone option, rather than in option E012. This is due to the nature and scale of the works required.	Yes
CH080	CH Threat 1	Y			Y	Y	Investigate and undertake detailed design coastal protection works to mitigate coastal erosion risk.	This action is proposing design and investigation of a permanent solution to the ongoing coastal erosion issue at this location.	Active intervention	Nelson Bay Beach	Western end of Nelson Bay Beach	Medium	High	PSC	DPHI - Crown Lands	Assets	Council, C&E Grants	$ 87,000	Year 1	$ -	$ 87,000	2	2	0	2	4	2	Yes	Council requested addition of this option to address ongoing erosion issues in this location.	No

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CH081	CH Threat 4		Y		Y	Y	Install tide gates/flaps on priority stormwater outlets.	This option provides for implementation of priority works identified under option CH075 at up to 20 sites.	Active intervention	All		High	Extreme	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 135,000	Year 4 and ongoing	$ 60,000	$ 495,000	3	2	2	2	6	2	Yes		Yes
CH082	All CH Threats	Y			Y	Y	Incorporate consideration of risk arising from coastal hazards into National Parks Plans of Management as part of scheduled updates.	NPWS periodically updates their PoMs for National Parks, Nature Reserves and other National Park Estate lands.	Planning for change	National Parks & Nature Reserves	All	High	Extreme	NPWS	NA		NPWS	$ -	As required	$ -	$ -	1	4	9	4	17	17	Yes		Yes
CH083	CH Threat 5				Y	Y	For those Council buildings located within the present day coastal inundation extent prepare/update the emergency action plans to provide guidance on preparedness and response to a coastal inundation event.	There are a number of Council owned buildings that are exposed to risk from coastal inundation in the event of a coastal storm such as an East Coast Low. It is recommended that these facilities have a plan in place to mitigate the impacts of inundation and manage the safety risk to occupants at the time of such an event.	Emergency response	All		Low	Extreme	PSC	NA		Council	$ -	Year 1	$ -	$ -	1	1	2	4	7	7	Yes		
DI001	ME Threat 1	Y	Y	Y	Y	Y	Work collaboratively and share information about major (CSSI/SSI) projects proposed for the open coastal waters to ensure appropriate consideration of the vision and objectives of this CMP and the objects of the *Coastal Management Act 2016*.	On 12 July 2023 the Federal Minister for the Climate Change and Energy declared the Hunter Offshore Renewable Area, extending offshore from Norah Head in the South to Port Stephens in the north. Being offshore of the study area for this CMP, there is potential for the infrastructure to pass through the study area. This option proposes a Memorandum of Understanding between Council and the WCLB (which includes Native Title claimants for the relevant State waters) to share information and work together to ensure sustainable coastal and offshore development.	Avoid future impact	All		High	High	PSC	WCLB	Strategy & Environment	Council	$ -	Year 1 to 5	$ 5,000	$ 25,000	2	4	8	2	14	7	Yes	This option is appropriate in the context of ongoing support and partnership between Council and the WCLB to management of coastal land.	Yes
E001	BD Threat 2	Y	Y	Y	Y	Y	Continue to support pest and weed control management activities on Council owned or managed land located in the coastal zone through the Hunter Regional Strategic Pest Animal Management Plan and Hunter Regional Strategic Weed Management Plan 2023-2027 under Council's existing program. This may involve Council undertaking a range of activities such as: - Weed control (e.g. removal, spraying); - Activities to reduce numbers of pest species (e.g. trapping to reduce risk of feral cats breeding, release of bio-control agents for rabbits and/or destroying warrens); - Monitoring and reporting of pests and weeds on coastal land managed by Council.	These plans have been developed by Hunter LLS and provide for coordinated pest and weed control by the relevant stakeholders. Biosecurity was identified as a key threat to coastal biodiversity.	Active intervention	All		High	High	PSC	NA	Strategy & Environment	Council, C&E Grants	$ -	Year 1 and ongoing	$ 25,000	$ 250,000	3	2	6	4	12	4	Yes		Yes
E002	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Informal access through the dunes is negatively impacting vegetation and the dune system in several locations along the beach. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	One Mile Beach	One Mile Beach	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 197,000	Year 3 and ongoing	$ 8,750	$ 258,250	3	3	6	2	11	4	Yes	There are ongoing issues at this location that need action as a priority. The key area is around the SLSC. There is risk to the road from dune movement.	Yes

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E004	BD Threat 2	Y	Y		Y	Y	Support implementation the Mambo Wetlands Plan of Management (PoM; PSC, 2006) , as updated from time to time. Activities to be implemented under the PoM include environmental protection and other works including: • Annual weed control programs. • Identify and control weeds at the source, using bush regenerators in on-ground control works. • Annual bush regeneration program as prioritised by PSC Bushland Assessment Tool. • Annual feral animal control program. • Ensure fire trails are maintained.	The Mambo Wetlands comprises a large area of Coastal Wetland. This option supports the ongoing management of this important area. When the current PoM is updated as per management action E018 (and any findings or recommendations arising from actions E008 and CH029), this management action would support implementation of the updated PoM.	Active intervention	Mambo Wetlands		High	High	PSC	NA	Natural Systems / Community Services	Council, C&E Grants	$ -	Year 1 and ongoing	$ 12,000	$ 120,000	3	2	4	4	10	3	Yes		Yes
E005	BD Threat 2	Y		Y	Y	Y	Support implementation of the Soldiers Point Littoral Rainforest Management Plan (Kleinfelder, 2021). Activities to be implemented under the Plan include environmental protection and other works, such as: • Monitoring the condition of the rainforest and undertaking works according to prioritisation by the PSC Bushland Assessment Tool. • Weed control by spot spraying and removing invasive species. • Planting local, endemic rainforest species in suitable locations. • Formalising walking tracks.	There is an area of Littoral Rainforest located at Soldiers Point.	Active intervention	Soldiers Point		High	High	PSC	NA	Strategy & Environment	Council	$ -	Year 1 and ongoing	$ -	$ -	1	2	3	4	9	9	Yes		Yes
E008	BD Threat 1	Y	Y		Y	Y	Undertake a survey of Mambo Wetlands to include habitat mapping and identify any trends in the habitat extents and condition since the previous survey(s).	The most recent survey was undertaken over 20 years ago. In addition, the recent replacement of the Foreshore Drive culverts with a bridge has altered the hydrological regime in the wetlands and is likely to have implications for wetland biodiversity.	Alert	Mambo Wetlands		High	High	PSC	NA	Strategy & Environment	Council, C&E Grants	$ 75,000	Year 2	$ -	$ 75,000	2	4	4	4	12	6	Yes	This an important wetland managed by Council and is highly values by the community.	Yes
E011	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Fingal Bay	Fingal Bay	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 197,000	Year 4	$ 8,750	$ 249,500	3	3	6	2	11	4	Yes	There are ongoing key issues at this location that require action as a stand-alone option.	No

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E012	RA Threat 2	Y	Y	Y	Y	Y	Undertake an ongoing program of sand management and dune rehabilitation works for all coastal foreshore land managed by Council. This includes managing public accessways, fencing, weeding and replanting with locally endemic species as detailed in Section 3.2.4 and Appendix D of the CMP. Co-benefits of this option relate to improved beach access and amenity, improved beach user safety, environmental rehabilitation, and coastal protection.	Sand management is a key issue for the study area and requires ongoing management by Council. In some locations, aeolian transport of sand is significant and can inundate recreational areas, accessways and other assets. In other locations coastal sediment transport processes (e.g. littoral drift) can result in accretion of sand in some locations and/or erosion others. Sand carting or beach scraping may be required to address these issues. At the same time, foreshore vegetation, dunes and accessways are subject to coastal erosion, an issue that may be compounded by members of the public cutting across dunes to access the beach rather than using formal accessways, resulting in loss of vegetation and further erosion. This compromises the integrity of the dunes, which function to provide protection for landward assets and also have ecosystem value. Beach accessways can become unsafe at times due to erosion (e.g. undermining) and regularly require repairs or replacement. Hence there is a need for ongoing active management of public beaches and dunes.	Active intervention	All	All	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 25,000	Year 1 and ongoing	$ 140,000	$ 1,425,000	4	4	7	4	15	4	Yes	There is an ongoing requirement to undertake work to protect and enhance foreshore public lands managed by Council, as well as manage the risks to public safety and the environment.	Yes
E013	RA Threat 2	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement of regulations along Stockton Beach and the Worimi Conservation Land in relation to unauthorised 4WD access and off-leash dog walking.	The current approach to managing these activities is not wholly effective and could benefit from increased compliance and enforcement to discourage inappropriate activities.	Active intervention	Open Coast	Stockton Beach	Medium	High	NPWS, WCLB	NA	NA	NPWS & WCLB	$ -	Year 1 and ongoing	$ -	$ -	1	3	6	3	12	12	Yes		Yes
E014	WQ Threat 1	Y	Y		Y	Y	Engage with NSW DPI on the implementation of the Marine Parks Network Management Plan within the Port Stephens-Great Lakes Marine Park.	There are a number of activities listed in the forthcoming Plan that identify Council as an implementation partner.	Active intervention	All	Port Stephens-Great Lakes Marine Park	Medium	High	PSC	DPI - Marine Parks	Strategy & Environment	Council	$ -	Year 1 and ongoing	$ -	$ -	1	5	4	3	12	12	Yes		Yes
E016	RA Threat 2	Y			Y	Y	Encourage local volunteer groups to support dune rehabilitation activities.	Provide direction, funding and support for community involvement in dune rehabilitation projects along the coast. Coordination of volunteers is by the Strategy and Environment team, but would be delivered by the Public Domain and Services team.	Active intervention	All		Medium	High	PSC	NA	Strategy & Environment	Council, C&E Grants	$ -	Year 1 and ongoing	$ 5,000	$ 50,000	2	2	3	4	9	5	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.	Yes
E017	RA Threat 2	Y			Y	Y	Undertake ongoing compliance monitoring and enforcement on Council managed land of regulations relating to unauthorised 4WD access and off-leash dog walking.	This option was added as a result of changes to Action E013, noting that Council had no jurisdiction on National Park or Worimi Conservation lands. However, Action E013 can be complemented by ongoing regulation of these activities by Council where they do have jurisdiction.	Active intervention	All	Council managed land	Medium	High	PSC	NA	Development & Compliance	Council	$ -	Year 1 and ongoing	$ -	$ -	1	3	6	3	12	12	Yes	This is part of Council's ongoing operations. There are key areas across the LGA missing volunteer support for dune rehabilitation and foreshore restoration.	Yes
E018	BD Threat 2	Y			Y	Y	Prepare a new, updated Plan of Management for Mambo Wetlands.	The current PoM for Mambo Wetlands was prepared in 2006 and could benefit from an update to better reflect the changes in the statutory environment and catchment land use, as well as the current condition, threats and pressures affecting the wetland. The new PoM should reflect the outcomes of related management actions E008 (Ecological survey of Mambo Wetlands) and CH029 (Adaptation Plan for Foreshore Drive locality).	Active intervention	Mambo Wetlands		High	High	PSC	NA	Strategy & Environment	Council, C&E Grants, NSW Environmental Trust (Protecting our Places)	$ 100,000	Year 3	$ -	$ 100,000	2	7	5	4	16	8	Yes		Yes

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E019	BD Threat 2	Y			Y	Y	Undertake management activities to contribute to threatened shorebird protection on NPWS Estate in accordance with approved conservation strategies and plans.	NPWS undertakes shorebird conservation and protection activities in accordance with approved Threatened Species Management Plans.	Active intervention	Mambo Wetlands		High	High	NPWS	NA		NPWS	$ -	Ongoing	$ -	$ -	1	3	6		9	9	Yes		Yes
HE001	RA Threat 2	Y	Y	Y	Y	Y	Develop an engagement protocol and strategy for Council engagement with Traditional Owners and Knowledge Holders.	Traditional Owners and Knowledge Holders play an important role in providing input on various projects and activities undertaken in the coastal zone by Council (and vice versa) and this function would benefit from formal acknowledgement and support.	Planning for change	National Parks & Nature Reserves	All	Medium	High	PSC	NA	Communications & Customer Experience	Council, C&E Grants	$ 75,000	Year 1 to 2	$ -	$ 75,000	2	4	5	4	13	7	Yes		Yes
HE002	BD Threat 2	Y		Y	Y	Y	Progress the implementation of the Soldiers Point Aboriginal Place Plan of Management in partnership with the Traditional Owners. Management strategies identified in the plan include: - Ongoing conservation and protection of significant heritage and cultural sites; - Environmental protection works including vegetation management, weed control, rehabilitation and re-vegetation works; and - Beach management work in the form of sand nourishment to minimise erosion, protection habitat and improve access and amenity.	This important site benefits from a co-management approach.	Active intervention	Soldiers Point		High	High	PSC	NA	Assets	Council, C&E Grants	$ 15,000	Year 1 and ongoing	$ 15,000	$ 150,000	3	2	4	4	10	3	Yes		Yes
RA001	RA Threat 2	Y	Y	Y	Y	Y	Develop a guideline and education program for private landholders detailing their responsibilities with respect to undertaking coastal protection works on private land and the relevant requirements with respect to engineering design, development controls and environmental approvals.	Private coastal protection and other works are contributing to key threats to the coastal zone, including encroachment on public land and environmental and heritage impacts.	Avoid future impact	All		Medium	High	PSC	DCCEEW - EHG	Communications & Customer Experience	Council, C&E Grants	$ 25,000	Year 2	$ -	$ 25,000	2	4	4	3	11	6	Yes	This is a necessary document requested by the community to provide support and guidance to owners of foreshore land.	Yes
RA002	RA Threat 1	Y			Y	Y	Progress the implementation of Council's *Boating and Fishing Infrastructure Plan* (Otium Planning Group, 2023).	Fishing and boating are key recreational activities that support the coastal economy. Sufficient and appropriate infrastructure minimises user conflicts.	Active intervention	All		Medium	High	PSC	TfNSW - MIDO	Capital Works	Council, Recreational Fishing Trust, NSW Boating Now, Destination Boat Ramp Grants	$ -	Year 1 and ongoing	$ -	$ -	1	3	4	4	11	11	Yes	Council has adopted the plan and will undertake implementation.	Yes

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RA003	RA Threat 2	Y			Y	Y	Develop a governance framework for coastal protection structures of unknown management status.	For many existing coastal structures the authority or person responsible for maintenance of the structure is not known and they are not maintained. Potential impacts of these structures on the environment and/or public safety and access may not be understood or managed appropriately. Liaise with Crown lands regarding the Marine Estate Management Strategy (MEMS) Breakwall governance and management project and agree to appropriate governance for foreshore structures ('breakwalls') in Port Stephens for which the party responsible for maintenance of the structure is not known.	Active intervention	All	Inner Port Outer Port	Medium	High	PSC	DPHI - Crown Lands	Assets	Council	$ -	Year 2	$ -	$ -	1	1	2	3	6	6	Yes	There are a number of seawalls in the study area for which the tenure/owner is not known and/or the structure may not have been approved. There is a need to develop an approach to managing these existing structures as they be in poor condition, and may also be adversely impacting public safety and access and the environment.	Yes
RA011	CH Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Council has historically undertaken sand carting to transfer accreted sand from the western end of the beach further east for improved beach width and volume for amenity reasons. While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Shoal Bay	Shoal Bay Beach	Medium	Extreme	PSC	NA	Assets	Council, C&E Grants	$ 295,000	Year 1 to 10	$ -	$ 2,585,000	4	0	5	4	9	2	Yes	This activity is critical to address an issue of public access and recreational amenity. The community highly values Shoal Bay Beach and it is also critical for tourism.	No
RA012	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Undertake works to control public access and revegetate the dune. A combination of high intensity public visitation and periodic erosion events has resulted in a need to repair or replace dune fencing, restrict access through eroded locations, and re-vegetate sections of the dune. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Shoal Bay	Shoal Bay Beach	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 450,000	Year 1 and ongoing	$ 55,100	$ 945,900	3	4	8	3	15	5	Yes	This option is critical to address the existing erosion issues and to provide future protection, implemented in conjunction with sand carting. This area is highly valued by the community.	Yes
RA016	CH Threat 2	Y			Y	Y	Sand carting to provide improved beach access and amenity.	Sand carting and beach nourishment activities have previously been undertaken at Conroy Park. The ongoing sand deficit at this location results in reduction in beach volume/width. This option has been developed based on Priority Action 1 from the Management Plan for Sandy Point/Conroy Park (Whitehead and Assoc, 2015). While the primary intent of the action is to improve beach amenity, there would also be a short-term co-benefit with respect to coastal protection.	Active intervention	Sandy Point / Conroy Park	Western side of Sandy Point	Medium	Extreme	PSC	NA	Capital Works	Council, C&E Grants	$ 122,500	Year 3	$ 10,000	$ 192,500	3	0	2	3	5	2	Yes	This option is critical to the use and protection of this area, which is highly valued by the community.	No
RA017	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location is affected by an ongoing sand deficit and would benefit from a more targeted action. While Council has a regular program of maintenance of dunes, this location requires more intensive efforts to manage the existing level of impact through a stand-alone option.	Active intervention	Corlette	Conroy Park	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 16,500	Year 4	$ 5,250	$ 48,000	2	4	3	2	9	5	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.	Yes

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RA020	CH Threat 1	Y			Y	Y	Landscaping works for bank stabilisation. This action involves re-vegetation works (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	The intent of this option is to undertake landscaping to assist in bank stabilisation. Where necessary some geotextile matting or coir logs may be placed to assist bank stabilisation. The extent of foreshore proposed for landscaping works is around 110 m long.	Active intervention	Tanilba	Mallabula Beach west of boat ramp	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 41,750	Year 6	$ 2,950	$ 53,550	2	3	1	2	6	3	Yes		Yes
RA027	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Salamander Bay	Roy Wood Reserve	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 50,000	Year 5	$ 3,500	$ 67,500	2	4	2	2	8	4	Yes	This location is highly valued by the community.	Yes
RA030	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Dutchmans Beach	Dutchmans Beach	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 52,500	Year 4	$ 3,675	$ 74,550	2	3	5	2	10	5	Yes	There are ongoing erosion issues at this location that require action. However, access is not a real issue and the effort should focus on erosion management.	Yes
RA031	CH Threat 1	Y			Y	Y	Repair or replace stairs and fix fencing to reinstate public access from the car park.	There have been concerns raised by the community regarding the length of time these stairs have been closed. They were closed and barricaded following erosion sufficient to render the stairs inaccessible and a safety risk.	Active intervention	Dutchmans Beach	Dutchmans Beach car park	Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 10,000	Year 1	$ 2,000	$ 28,000	2	0	4	4	8	4	Yes	This location is highly valued by the community.	Yes
RA034	RA Threat 2	Y			Y	Y	Undertake works to manage access and rehabilitate the dunes. This action involves renewal of dune fencing and dune re-vegetation (including sediment controls), with a provision for ongoing annual maintenance (e.g. weeding and replanting as required).	Dune re-vegetation and management of accessways supports dune stability and reduces impacts from public access. While Council has a regular program of maintenance of dunes, this location requires a more extensive fencing and re-vegetation works.	Active intervention	Nelson Bay Beach		Medium	High	PSC	NA	Public Domain & Services	Council, C&E Grants	$ 114,000	Year 4	$ 7,000	$ 156,000	3	3	6	3	12	4	Yes	There are ongoing issues at this location that need action. It is a highly valued locality for the community.	Yes
RA036	RA Threat 2	Y			Y	Y	Minor shoreline re-profiling and landscaping works to stabilise the foreshore and provide improved amenity, as per the detailed description provided in Section 3.2.4 of the CMP.	The community is concerned about the ongoing erosion at this location. The proposed works would involve some minor re-profiling to create a shoreline profile similar to the nearby beach, with additional stabilisation provided by geotextile or jute meshing and coir logs, as required. Landscaping would be used to both stabilise the shoreline and control public access.	Active intervention	Kangaroo Point		Medium	High	PSC	NA	Capital Works	Council, C&E Grants	$ 233,000	Year 7	$ 21,875	$ 298,625	3	1	4	1	6	2	Yes	There is an existing study that examines the processes that are causing erosion at this location. There are Hunter Water assets in this location that also need protection	Yes
RA045	CH Threat 7	Y			Y	Y	Dredging to improve access to the boat ramp and Soldiers Point marina.	Naturally occurring sediment transport processes can result in the accretion of sand in navigational areas, limiting access to boat ramps or marinas. This action provides for maintenance dredging to address this issue.	Active intervention	Little Beach, Nelson Bay, Soldiers Point, Taylors Beach		High	High	PSC	NA	Public Domain & Services	Council	$ 174,500	Year 1 and ongoing (as reuqired)	$ 50,611	$ 630,000	3	3	1		4	1	Yes		No
WQ002	All WQ Threats	Y	Y		Y	Y	Enter into a data sharing agreement to enable sharing of historical and ongoing water quality monitoring data undertaken in Port Stephens.	There are a number of stakeholders engaging in monitoring. This option facilitates ease of data sharing for water quality monitoring, studies and investigations.	Alert	All		High	High	PSC	DCCEEW - EHG, DPI - Fisheries, DPI - Marine Parks, MCC	Strategy & Environment	Council	$ -	Year 1	$ -	$ -	1	2	10	3	15	15	Yes	There is currently no such formal arrangement in place to facilitate data sharing and knowledge building for Port Stephens as a whole.	Yes

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WQ003	All WQ Threats	Y	Y		Y	Y	Implement a Water Quality Monitoring Program focussed on risk to aquatic recreation. As a secondary objective, the monitoring should evaluate catchment pollutant inputs.	The health of aquatic recreational users can also be impacted by poor water quality, in particular faecal contamination. This option proposes to sample popular swimming beaches during the peak swimming season to evaluate risk to people engaging in primary and secondary contact recreational activities. As a secondary objective for the water quality monitoring program, sampling for key parameters (i.e. nutrients) will also be undertaken at key stormwater outlets at the same locations with a view to identifying potentially problematic pollutant sources in the catchment.	Alert	Shoal Bay Beach Little Beach Nelson Bay Beach Corlette		High	High	PSC	DCCEEW - EHG	Strategy & Environment	Council, C&E Grants	$ 22,500	Year 1 and ongoing	$ 73,100	$ 753,500	3	6	7	4	17	6	Yes	Council currently lack a water quality monitoring program.	Yes
WQ004	BD Threat 1					Y	In order to maintain vegetated riparian corridors through the development process, planning proposals to re-zone land within the Coastal Environment Area developed or evaluated by Council will adopt land use zonings appropriate to maintain Vegetated Riparian Zones consistent with those specified in the Controlled activities - Guidelines for riparian corridors on waterfront land.	Port Stephens is an environmentally sensitive waterway with conservation significance. There is a need to minimise the impact of urban stormwater runoff. Ancillary benefits relate to visual amenity and wildlife corridors.	Avoid future impact	All		High	High	PSC	DPHI - Planning	Development & Compliance	Council	$ -	Year 1 and ongoing	$ -	$ -	1	9	5	1	15	15	Yes	Required for adequate consideration of impacts of development and for future planning.	No
WQ005	WQ Threat 1	Y	Y		Y	Y	Develop and implement a campaign targeted at improving the awareness of the general community on catchment management practices relating to water quality improvement in Port Stephens. Key issues include, but are not limited to: - Risks associated with failure of Onsite Sewage Management Systems (e.g. from flooding or coastal hazards), - Impacts of companion animal faeces on water quality, - Use of fertilisers, herbicides and pesticides, - Impacts of erosion and sedimentation, and - General diffuse sources of pollution associated with activities around the home.	The practices of private landholders are a key diffuse source of stormwater pollutants.	Alert	All		Medium	High	PSC	NA	Communications & Customer Experience	Council, C&E Grants, Environmental Trust (Environmental education)	$ 30,000	Year 2 and ongoing	$ -	$ 30,000	2	5	3	2	10	5	Yes	This is an important activity to support the community to address potential water quality issues, noting also the sensitivity of the receiving environment.	Yes
WQ007	WQ Threat 4	Y			Y	Y	Undertake an investigation to identify wastewater pump stations in the Port Stephens catchment that require upgrading as part of a broader wastewater pump station improvement program that will reduce the risk of wastewater overflows by providing additional emergency storage at selected sites.	The community has expressed concern about the risk of overflows from the wastewater pump station in Shoal Bay. However, HWC advised that addressing this risk is part of a broader program and has committed to undertaking the initial investigation to scope the improvements that might be required (if any) at this site and others in the catchment.	Active intervention	Port Stephens		Low	High	HWC	NA	NA	HWC	$ 100,000	Year 1	$ -	$ 100,000	2	1	3	2	6	3	Yes		Yes

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WQ008	WQ Threat 1	Y			Y	Y	Provide for ongoing enforcement of regulations in dog on-leash areas. In addition, undertake a review of dog on-leash and off-leash areas with a view to confirming the appropriateness of off-leash dog areas with respect to community uses of these areas and their environmental sensitivity (e.g. shorebird roosting or nesting areas). Review existing dog on-lead signage in key locations (e.g. Tanilba Bay) and provide more signage where required.	Studies have shown dog faeces is a material source of faecal contamination in coastal waters. Stakeholders identified that off-leash dogs can disturb other recreational users and can have a material impact on migratory waders and shorebirds. Reference should also be made to Option WQ005, which provides for community education.	Active intervention	All		Medium	High	PSC	NA	Assets and Compliance	Council	$ 20,000	Year 2	$ -	$ 20,000	2	2	3	2	7	4	Yes	This option supports Council's ongoing operations.	No
WQ009	WQ Threat 4	Y	Y		Y	Y	Beachwatch monitoring program for recreational water quality at ocean beaches (continued program).	The Beachwatch Program, in partnership with NSW DCCEEW, is undertaken every year from the start of November to the end of March, with five samples collected each month from four ocean beaches.	Active intervention	Box Beach Fingal Beach One Mile Beach Zenith Beach		High	High	HWC	DCCEEW - EHG	NA	HWC	$ -	Year 1 and ongoing	$ -	$ -	1	4	5	4	13	13	Yes		No
WQ010	WQ Threat 5	Y			Y	Y	Support the community to dispose of recreational fishing waste appropriately.	Install tackle bins at popular recreational fishing sites to reduce the incidence of fishing waste (e.g. hooks, lines) entering coastal waters. Three tackle bins have been manufactured and installed by the South Tomaree Community Associated to date. OzFish can provide tackle bins upon request. Council could assist the community with installation and education programs that promote the use of the bins via Council's webpage, environmental newsletter, and local media. DPI - Fisheries offer programmes for community Tackle Bins.	Alert	All		High	High	PSC	DPI - Fisheries	Waste Management	Council, Recreational Fishing Trust Grant	$ -	Year 1 and ongoing	$ -	$ -	1	1	4	4	9	9	Yes		Yes

Appendix H

Detailed Options Summaries

Option CH001 – Develop and implement a coastal hazard monitoring strategy

Location(s): Port Stephens coastal zone.

Coastal threat(s) to be addressed: All coastal hazard threats.

Cost: The cost estimate includes:

- $15,000 for a consultant to scope the monitoring strategy.
- $67,000 annually recurrent cost to undertake annual beach surveys and after large storm events, assumed to occur every three years on average.

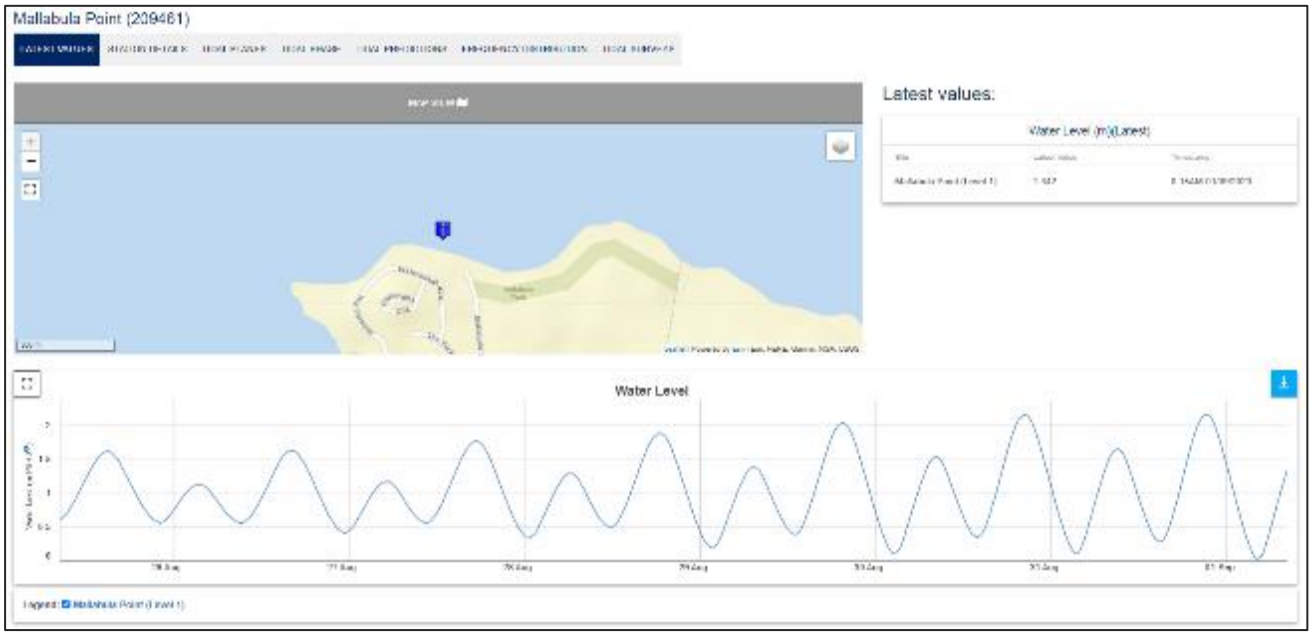
Option Description: Data collection is integral to developing an understanding of coastal processes and the impacts of coastal hazards on the study area. Analysis and quantification of coastal processes is a data driven process that is heavily reliant on long time series data sets.

The monitoring program should aim to:

- Establish a high quality, fit for purpose data set suitable for monitoring coastal processes, identifying trends and tracking change;
- Better understand the impacts of coastal processes on the study area in relation to storm events and inter- and intra-annual variation (e.g., in relation to El Niño – Southern Oscillation cycle);
- Measure the impacts of climate change, in particular sea level rise; and
- Identify if triggers for adaptive management have been reached for relevant management options.

Council currently has three CoastSnap monitoring sites at Shoal Bay, Nelson Bay and Birubi Point and the CMP includes an option for an additional site at Fingal Bay (Option CH009). The data and analyses derived from these CoastSnap sites should form part of the monitoring program.

There is currently one Manly Hydraulics Laboratory (MHL) water level gauge in Port Stephens at Mallabula Point (209461) that can be used along with data from the Crowdy Head water level gauge to evaluate sea level rise. A screen shot of the MHL web portal for this gauge is shown in the image below (source: https://mhl.nsw.gov.au/Station-209461).



CMP Assessment:

Effectiveness and benefits:	• The monitoring would support knowledge building and improve understanding of coastal processes and the impact of coastal hazards on Port Stephens, including longer term trends such as climate change. • It would enable monitoring and evaluation of coastal hazard mitigation actions implemented under the CMP.

Option CH001 – Develop and implement a coastal hazard monitoring strategy		
Option Type:	☒ **Alert** ☐ Avoid future impact ☐ Active intervention ☐ Planning for change ☐ Emergency response	
Timing: The option has been programmed to commence in Year 1 of the CMP.		
Related management options: • CH002 – Monitoring of Council coastal protection structures. • CH009 – Additional CoastSnap monitoring site. • CH077 – Supported dune recovery following erosion events. • E012 – Sand management option. • Options that will incorporate the use of 'triggers' or 'thresholds', including CH005, CH012, CH014, CH029, RA011, and RA016.		

Option CH012 - Develop and implement a strategy for key access roads impacted by tidal inundation

Location(s): This option relates to low-lying local and regional roads at risk of permanent tidal inundation (or more regular coastal inundation) that act as key access roads; that is, they provide the only emergency access and evacuation routes for parts of the LGA. The roads that are the subject of this option include:

- Marsh Road;
- Lemon Tree Passage Road;
- Fenninghams Island Road;
- Taylors Point Road;
- Nelson Bay Road;
- Cabbage Tree Road;
- Port Stephens Drive;
- Swan Bay Road; and
- Davis Road.

Coastal threat(s) to be addressed: Primarily tidal inundation and also coastal inundation.

Cost: The cost of this option relates to the preparation of a strategy and associated modelling, civil design and stakeholder engagement in relation to key low-lying key access roads. This has been estimated at a cost of $200,000.

Option description: There are large areas of the coastal zone that are low-lying and vulnerable to inundation due to elevated estuary water levels. The coastal hazard modelling undertaken by BMT (2021a) in Stage 2 of the CMP showed that there are a number roads that would be subject to tidal inundation (HAT) in 2120. The accompanying risk assessment report (BMT, 2022a) identified all roads at risk from coastal and tidal inundation for each of the four planning horizons (present day, 2040, 2070 and 2120). Some of these roads (e.g. Shoal Bay Road, Shoal Bay, and Meredith Avenue, Lemon Tree Passage) would be considered under the adaptation plans proposed for those localities, and these have been excluded from this option for that reason.

However, a subset comprise key access roads under care and control of Council. The maps provided below show the 2120 tidal inundation extent (HAT) in blue and 2120 100-year ARI coastal inundation extent in green. Sections of road highlighted in red were identified by BMT (2022a) as being at high risk of inundation in the present day due to a 100-year ARI coastal inundation event, which means they would have 1% likelihood of being inundated due to elevated estuary water levels in any given year. Sections of roads highlighted yellow were considered by BMT (2022a) to be at 'high' or 'extreme' risk of inundation by 2120 due to tidal inundation and would be inundated quite regularly (e.g. on King Tides) or even permanently due to astronomical tides. Where these are combined with a storm event resulting in even higher estuarine water levels, the depth and duration of inundation would be even greater.

Salt Ash

Option CH012 - Develop and implement a strategy for key access roads impacted by tidal inundation

Salt Ash to Bobs Farm

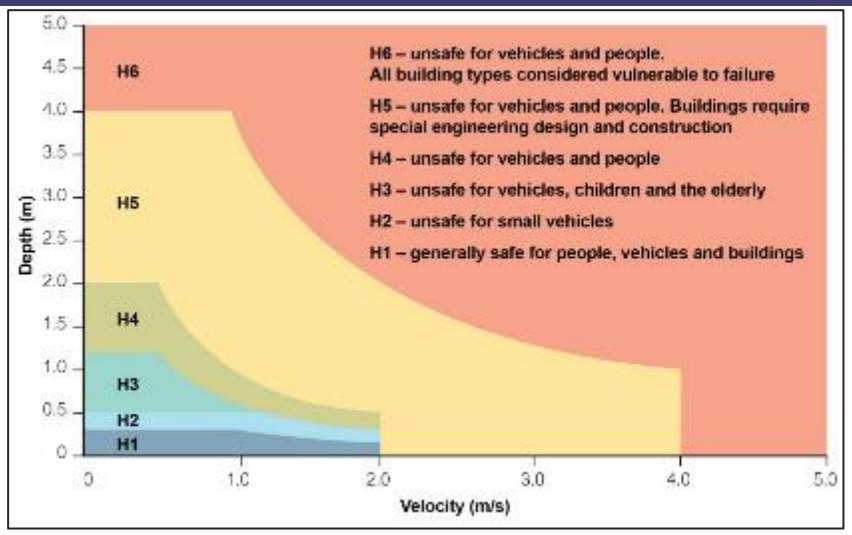
Bobs Farm to Nelson Bay

Swan Bay

This would affect both day to day access to properties and services in some parts of the study area, but is of particular concern during an emergency, such as for the evacuation of people who are experiencing a medical emergency by ambulance to John Hunter Hospital.

Flood Risk Management Guideline FB03 (DPE, 2023), part of the NSW Floodplain Management Manual, identifies that inundation depths ≥0.3 m present a hazard to vehicles (see figure below) and roads would be considered impassable under these conditions.

Option CH012 - Develop and implement a strategy for key access roads impacted by tidal inundation



Those roads that are tidally inundated to a depth ≥0.3 m in 2120 are indicated with an orange line in the figure below. These sections of low-lying roads would be deemed impassable to light vehicles. The blue area indicates the 2120 tidal inundation extent.

Another impact associated with inundation of roads is the increased maintenance and repair requirements. IPWEA's *Practice Note 12.1 – Climate Change Impacts on the Useful Life of Infrastructure* (2018) note issues such as lifting of bitumen surfaces from submerged roads and reduced bond strength of bitumen exposed to salt. Aspects that would need to be considered as part of the strategy include (but are not limited to):

- Understanding the frequency, depth and duration of inundation due to tidal and coastal inundation;
- Interactions between catchment flooding and coastal and tidal inundation (joint occurrence);
- A range of engineering options to reduce inundation risk such as road raising levees, drainage improvements, or planned retreat or provision of alternative access;
- The need for utility relocations or modifications (e.g. stormwater, potable water, sewage, telecommunications and electricity), as well as consideration of service requirements (e.g. clearances for over height vehicles (e.g. garbage trucks) where roads and utilities are to be raised;
- Maintenance of property access;

Option CH012 - Develop and implement a strategy for key access roads impacted by tidal inundation

- Evaluation of potential planning approvals pathways and environmental impacts of the options considered;
- Asset life-cycle modelling to evaluate the optimal timing of capital expenditure associated with adaptation works (e.g. road raising) versus increase in expenditure on maintenance under increased inundation frequency and duration;
- An analysis of the frequency of inundation (e.g. no. days per year inundated / inundated >0.3 m) would assist with prioritisation of these key access roads and to inform the life-cycle analysis;
- A costed adaptation pathway (sequence of works and timeframe);
- Multi-stakeholder involvement.

CMP Assessment:

Benefits:	• Ongoing access for residents and to services. • Emergency access and evacuation routes maintained.
Disadvantages	• Requires coordination with a number of stakeholders. • Modification of drainage patterns has potential to have adverse impacts on the environment.
Option Type:	☐ Alert ☐ Avoid future impact ☐ Active intervention ☒ **Planning for change** ☐ Emergency response

Timing: The long-term strategy would need to identify 'Thresholds' or 'Triggers' specific to the affected roads which represent a point at which the level of impact from tidal inundation on access becomes unacceptable and a different adaptation pathway is adopted. These would be established during asset life-cycle modelling and development of the adaptation pathway. The trigger point for the adopted thresholds for each road requires analysis of the timeline between when the threshold is reached and when the response is required (i.e. the time available to implement the response). This analysis would include consideration of a monitoring period, response time, and a safety buffer for uncertainty, as well likely availability of funding and Council's ongoing program of road maintenance.

In order to adequately plan, prepare and implement adaptation, the planning should commence as soon as possible. The preparation of an adaptation plan at a concept stage has been included in this CMP. If the concept stage plan identifies the need for more detailed planning, this would then proceed, or be considered in the revision of this CMP if more than 10 years has passed.

Related management options:

- CH005 – Adaptation plan for Tilligerry Peninsula;
- CH029 – Adaptation plan for Foreshore Drive;
- CH073 – Adaptation plan for Shoal Bay precinct.

Option RA011 – Sand carting / beach nourishment for improved beach amenity

Location: Shoal Bay Beach

Coastal threat(s) to be addressed: Beach erosion, shoreline recession.

Cost: The cost is estimated at a cost of $240,000 per sand carting operation based on:

- $15,000 for site establishment by the Contractor; and
- $225,000 for the sand carting operations (based on a rate of $22.50/$m^3$ for an assumed average volume of 10,000m^3).

For purposes of the business plan, it is assumed sand carting would be undertaken annually.

In addition, provision has been made for expenditure as follows:

- $15,000 to undertake initial studies to inform the sand carting works design and methodology in Year 1 (e.g. beach survey, etc.);
- $40,000 for preparation of an environmental impact assessment, permits and approvals (and including Traditional Owner engagement for due diligence assessment purposes), assuming undertaken once every 5 years (in Years 1 and 6) as is typically required for permits and licences; and
- $10,000 for annual beach monitoring surveys to identify if the works have been triggered.

Option Description: Shoal Bay has a dynamic 2.5 km long sandy shoreline extending from Nelson Head to Tomaree Head. The western end of the beach is reflective and has a wider beach and dune system. This area is supplied with sand by the dominant westward longshore transport, which is estimated in the order of 10,000 m^3/year, 5,000 m^3 (normal conditions) to over 15,000 m^3 (under higher energy conditions) (BMT, 2011). The eastern side of the bay has a narrower beach and a very limited dune system (narrower and lower dunes). With limited sand supply, the central to eastern part of Shoal Bay Beach is gradually eroding.

The lack of beach width in this location adversely affects recreational usage and enjoyment of the beach by the community and visitors. In addition, the ongoing sand deficit causes undermining of stairs and accessways and is eating into the dunes in locations. A co-benefit of this activity is short-term coastal protection.

This option proposes carting of sand from the western section of the beach and nourishment of the eroding sections of Shoal Bay Beach with around 5,000 m^3 of sand twice a year or 10,000 m^3 of sand annually to provide improved beach access and amenity. Littoral drift causes the western section of the beach to accumulate sand before bypassing around Nelson Head (estimated at 10,000 m^3/year on average).

Frequent beach survey should be performed, and sand carting should be activated when trigger levels relating to beach volume are met (e.g., eroded beach sand volume above HAT level).

CMP Assessment:

Effectiveness:	• The works would be effective over the short to medium term in addressing shoreline erosion arising from sediment transport processes. The sand would gradually be transported from the east back to the west and accumulate at the western end of the beach, hence the requirement for repeated carting of sand.
Benefits:	• Provides improved recreational amenity for visitors to the beach.
Disadvantages:	• Requires ongoing commitment on behalf of Council to maintain the works, particularly in relation to episodic erosion events. • Short-term temporary disruption to beach users and nearby residents.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed to commence in Year 1 and each year thereafter for the 10-year CMP.

Option CH017 – Progress investigations to assess coastal erosion risk to Shoal Bay Road and (if required) evaluate feasible coastal protection options

Location: Shoal Bay Road

Coastal threat(s) to be addressed: Beach erosion, shoreline recession.

Cost: The cost of engaging a suitably qualified consultant to undertake the study is estimated at $200,000.

Option Description: A semi-quantitative assessment of coastal erosion risk for the Outer Port undertaken by BMT (2021a) rated the shoreline adjacent to this section of Shoal Bay Road as being at 'moderate' risk of erosion (orange line in the figure overpage) with limited potential for recovery on the basis of the following shoreline characteristics:

- Degraded dune and narrow beach;
- Being semi-exposed to wave activity;
- Having a minor longshore sediment transport deficit; and
- With some adaptive capacity due to the presence of dune between the beach and adjacent assets.

As shown in the map below, the road was not identified by BMT (2021a) as being at risk of coastal inundation in the present day (darker green) or by 2120 (lighter green) for the 100-year ARI event. Irrespective of the present day risk, given Shoal Bay Road provides the only access to parts of Shoal Bay and Fingal Bay, Council is concerned that the level of risk is unacceptably high.

It is noted that the outcome of the investigations may be that there is no imminent risk to the road from coastal erosion and that the works could be delayed until a future point in time. Reference should also be made to option CH073, which proposes an adaptation strategy for the Shoal Bay precinct. The preferred option identified in the study for Shoal Bay Road should be consistent with the approach proposed under the adaptation plan. For example, if the adaptation plan determines to relocate Shoal Bay Road, this option would no longer be required. In the interim, the CZEAS prepared for the CMP will provide for protection of the road in the event of an increase in erosion risk that triggers action under the CZEAS.

CMP Assessment:

Benefits:	• The study would provide Council with an understanding of the level of risk to this key access road.

Option CH017 – Progress investigations to assess coastal erosion risk to Shoal Bay Road and (if required) evaluate feasible coastal protection options

	• Enables development of a 'shovel-ready' project ready for implementation in the next CMP (2035-2045).
Disadvantages:	• The coastal erosion hazard extents have not been quantified for this location, and therefore the timing and magnitude of risk to public and private land is not at this time known. • In order to obtain funding under the NSW Coastal and Estuary Management Program, the coastal erosion hazard extents and a detailed CBA are required to apportion the cost of implementation to identified beneficiaries.
Option Type:	☐ Alert ☒ **Avoid future impact** ☐ Active intervention ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed to commence in Year 3 of the CMP, which aims to have the preferred option identified in time to input into the next (2035-2045) CMP.

Related management options:

- CH073 – Adaptation plan for the Shoal Bay precinct.
- CH072 – Coastal erosion hazard investigation.
- RA011 – Sand carting at Shoal Bay.
- RA012 - Access management and dune rehabilitation.

Option CH073 – Adaptation strategy for the Shoal Bay precinct

Location(s): Shoal Bay

Coastal threat(s) to be addressed: Coastal inundation, tidal inundation, coastal erosion, shoreline recession.

Cost: The option in the CMP is the preparation of an adaptation strategy and associated modelling, civil design and community and stakeholder engagement. This has been estimated at a cost of $200,000.

Option Description: Shoal Bay appears to be affected by a sand deficit resulting in long-term shoreline recession, placing some private and public assets at risk. Frequent undermining of stairs and dune erosion is placing at risk public assets near the boat ramp (see photos below), and Council regularly has to replace or repair the stairs, as shown in the photo below (left). The ongoing and repeated erosion issues at this location have also necessitated the removal of some fencing in the eroded area and retreat of other recreational assets is currently being considered. The section of Shoal Bay Road that is located closest to the dune (see photo below right, image source: NearMap) is also of concern to Council due to its exposure to erosion hazard. Shoal Bay Road provides the only road access into Shoal Bay and Fingal Bay. The decision whether to protect this road in its current location or whether it should be relocated is a key decision; however, the absence of coastal erosion hazard mapping for this location means that the degree and timing of risk to the road is not yet known.

In addition, there is a degree of risk from coastal and tidal inundation, and other natural hazards (such as bushfire) that are likely to be important considerations. The coastal inundation modelling undertaken by BMT (2021a) in Stage 2 of the CMP showed that the eastern portion of Shoal Bay Road and adjacent properties will be subject to coastal inundation in 2120, as shown in the green areas on the map. In addition, the narrow beach and public open space along the shoreline would be inundated several times a year by 2120 due to sea level rise; that is, these areas are below the 2120 tidal inundation level (HAT) shown in blue on the map overpage.

Given the current level of development of Shoal Bay and the importance of this precinct for tourism and the regional economy, the potential risk from coastal hazards indicates a need to consider a more holistic approach to protection from coastal hazards and the future development and use of this area. The potential risk to Shoal Bay Road in itself is of particular concern. To this end Council has already commenced discussions with key stakeholders, namely NPWS and Crown lands, who are both key landholders in the area, about the potential of relocating Shoal Bay Road. Hence, it is proposed that an adaptation strategy be developed for Shoal Bay to ensure an appropriate balance between development and maintenance of the natural and other assets that attract visitors to Shoal Bay.

Option CH073 – Adaptation strategy for the Shoal Bay precinct

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

- Interactions between catchment flooding and coastal and tidal inundation (joint occurrence);
- Land acquisition or land swaps to facilitate planned relocation and/or provide for future public open space and recreational areas;
- Ongoing provision of services and the need for utility relocations or modifications (e.g., stormwater, potable water, sewage, telecommunications and electricity);
- Drainage improvements for local rainfall events;
- A costed adaptation pathway (sequence of works and timeframe); and
- Multi-stakeholder involvement.

CMP Assessment:

Benefits:	• Enables improved understanding of the impacts of climate change on the precinct, particularly with respect to joint occurrence events (e.g., combined catchment flooding and coastal inundation due to an east coast low). • Facilitates improved community understanding of the hazards and risk, and discussion on acceptable and unacceptable levels of risk to built, natural and cultural assets. • Facilitates planning for and coordination of a response by the various relevant stakeholders.
Disadvantages:	• It may be difficult to address all views in the community or amongst the stakeholders on the preferred risk management strategy. • The benefits are likely to be accrued primarily in the long-term, whereas the cost may be incurred primarily in the short to medium-term.
Option Type:	☐ Alert ☐ Avoid future impact ☐ Active intervention ☒ **Planning for change** ☐ Emergency response

Timing: The adaptation plan will identify 'Thresholds' or 'Triggers', which represent a point at which the level of impact from tidal inundation becomes unacceptable and a different adaptation pathway is adopted. These would be established during development of the adaptation pathway. The trigger point for this threshold requires analysis of the timeline between when the threshold is reached and when the response is required (i.e., the time available to implement the response). This analysis would include consideration of a monitoring period, response time, and a safety buffer for uncertainty.

In order to adequately plan, prepare and implement adaptation, the planning should commence as soon as possible. It is currently programmed for Year 2-3 of the CMP. The preparation of an adaptation plan at a concept stage has been included

Option CH073 – Adaptation strategy for the Shoal Bay precinct

in this CMP. If the concept stage plan identifies the need for more detailed planning, this would then proceed, or be considered in the revision of this CMP if more than 10 years has passed.

Related management options:

- CH001 – Coastal hazard monitoring strategy,
- CH072 – Coastal hazard investigation for Port Stephens.

There were also a number of options identified in the long-list of options that did not proceed beyond the feasibility assessment due to the need to develop a holistic adaptation strategy. These may be re-visited during the development of the adaptation strategy, where appropriate. They include options:

- CH008 – Planned retreat of recreational assets near boat ramp,
- CH014 – Coastal protection works for Shoal Bay Road,
- CH015 – Groyne to mitigate coastal erosion,
- CH016 – Groyne at Western Shoal Bay to mitigate erosion,
- CH017 – New seawall to mitigate coastal erosion risk to Shoal Bay Road,
- CH018 – Relocate Shoal Bay Road,
- CH069 – Beach nourishment, and
- CH070 – New seawall to mitigate coastal erosion risk to built assets near the boat ramp.

Option CH029 – Adaptation strategy for the Foreshore Drive locality

Location(s): Salamander Bay

Coastal threat(s) to be addressed: Coastal inundation, tidal inundation, coastal erosion, shoreline recession.

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

Option Description: Foreshore Drive in Salamander Bay is located adjacent to the conservation significant Mambo Wetlands. The culverts at one of the key outlets of the wetlands to the Port were washed away during coastal storms in 2021, highlighting the vulnerability of this location to both catchment flooding and coastal hazards. The road was closed for months while the culvert was replaced with a new bridge.

The coastal hazard modelling undertaken by BMT (2021a) in Stage 2 of the CMP showed that large areas of the Foreshore Drive locality will be inundated several times a year by 2120 due to sea level rise; that is, these areas are below the 2120 tidal inundation level (HAT) shown in blue on the map below. The modelling also identified that, by the year 2120, an even larger area of low-lying land would be impacted by coastal inundation during a 100-year ARI storm, shown in green on the map below.

While the majority of the subject land is undeveloped, this frequency of inundation represents an unacceptable level of risk with respect to public and private assets and public safety. The key impacts on the locality would likely include:

- Loss of (or decline in) functionality due to rising groundwater levels (e.g., stormwater or sewage infrastructure);
- Increased maintenance cost due to deterioration of materials (e.g., road pavement, foundations);
- Short-term and eventually permanent loss of access for both pedestrians and vehicles along Foreshore Drive;
- Safety risks associated with electrical services; and
- Debris impacts and wave loading associated with coastal inundation.

This would likely render the area uninhabitable or unfit for its current use.

In addition, there is a risk to the biodiversity values of Mambo Wetlands, which are mapped as a Coastal Wetlands Coastal Management Area under the Resilience and Hazards SEPP. It is of note that the community has observed significant changes in the wetlands since the construction of the new bridge, which permits greater tidal flows into and out of the wetland. One

Option CH029 – Adaptation strategy for the Foreshore Drive locality

community member remarked that water quality appears to have improved since the works. Under sea level rise conditions with increased tidal inundation, it is reasonable to anticipate changes to the wetland hydrology and hydraulics and water quality, resulting in changes in wetland vegetation and associated species.

Mambo wetlands are also of significant cultural value to the Worimi. There are a range of tangible and intangible values associated with the wetlands, including a number of heritage listed and other cultural sites, as well as cultural resources and plants, animals and birds significant as spiritual totems. These values could be placed at risk due to tidal inundation.

The tidal inundation mapping prepared by BMT (2021a) highlights that the level of risk will increase over time and an adaptation strategy would provide an avenue to consider the appropriate balance between protection of public, private, natural and cultural assets.

Adaptation planning should consider the ongoing viability of the current use of the land and which values or uses the community would like to maintain in the long-term based on the risk appetite of the community. Given the level of risk, retreat may be a suitable option for some assets, such as Foreshore Drive. The risk to private development may require a combination of re-zoning land, land acquisition and property development controls. The removal of built assets from low lying areas may also provide opportunities for intertidal species migration and other adaptation of natural assets.

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

- Interactions between catchment flooding and coastal and tidal inundation (joint occurrence);
- Water quality, water balance and hydraulics in Mambo Wetland;
- The impacts of changes in the abovementioned processes for the biodiversity of Mambo Wetland;
- Potential impacts of tidal inundation and any adaptation strategies on Aboriginal cultural heritage and values;
- A range of engineering options to reduce risk to property such as levees, filling of land, drainage improvements, planned relocation, house raising, etc.;
- Ongoing provision of services and the need for utility relocations or modifications (e.g., stormwater, potable water, sewage, telecommunications and electricity);
- Land acquisition or land swaps;
- Maintenance of property access and management of inter-lot drainage for retained properties;
- A costed adaptation pathway (sequence of works and timeframe);
- Multi-stakeholder involvement.

CMP Assessment:

Benefits:	• Enables improved understanding of the impacts of climate change on built, natural and cultural assets in and adjacent to the Mambo Wetlands, particularly with respect to joint occurrence events (e.g., combined catchment flooding and coastal inundation due to an east coast low). • Facilitates improved community understanding of the hazards and risk, and discussion on acceptable and unacceptable levels of risk to built, natural and cultural assets. • Facilitates planning for and coordination of a response by the various relevant stakeholders.
Disadvantages:	• It may be difficult to address all views in the community or amongst the stakeholders on the preferred risk management strategy. • The benefits are likely to be accrued primarily in the long-term, whereas the cost may be incurred primarily in the short to medium-term.
Option Type:	☐ Alert ☐ Avoid future impact ☐ Active intervention ☒ **Planning for change** ☐ Emergency response

Timing: The adaptation strategy will identify 'Thresholds' or 'Triggers', which represent a point at which the level of impact from tidal inundation becomes unacceptable and a different adaptation pathway is adopted. These would be established during development of the adaptation pathway. However, for the purpose of CMP planning, it is apparent that frequent inundation of the low-lying properties near Foreshore Drive would likely occur by 2070. This may be considered the threshold where these locations begin to lose their liveability. The trigger point for this threshold requires analysis of the timeline

Option CH029 – Adaptation strategy for the Foreshore Drive locality

between when the threshold is reached and when the response is required (i.e., the time available to implement the response). This analysis would include consideration of a monitoring period, response time, and a safety buffer for uncertainty.

In order to adequately plan, prepare and implement adaptation, the planning should commence as soon as possible. It is currently programmed for Year 5 of the CMP. The preparation of an adaptation plan at a concept stage has been included in this CMP. If the concept stage plan identifies the need for more detailed planning, this would then proceed, or be considered in the revision of this CMP if more than 10 years has passed.

Related management options:

- CH001 – Coastal hazard monitoring strategy
- E018 – Prepare new, updated Plan of Management (PoM) for Mambo Wetlands.

There were also a number of options identified in the long-list of options that did not proceed beyond the feasibility assessment due to the need to develop a holistic adaptation strategy. These may be re-visited during the development of the adaptation strategy, where appropriate. They include Options:

- CH030 – Flood gates to prevent tidal inundation,
- CH031 – Retreat of Foreshore Drive, and
- CH032 – Road raising.

Option CH022 – Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park

Location(s): Sandy Point

Coastal threat(s) to be addressed: Coastal erosion, shoreline recession, coastal inundation, encroachment onto public land.

Cost: The total cost of $285,000 includes:

- Aboriginal cultural heritage due diligence assessment (incl. Traditional Owner engagement) - $15,000
- Investigations (rock sourcing and geotechnics) - $40,000
- Detailed design - $200,000
- Costing studies - $30,000.

Option Description: The gradual movement of the 'Flood Tide Delta' into the Port has amplified refraction swell waves entering Port Stephens from the northeast, causing erosion along Conroy Park and Sandy Point (Whitehead & Assoc., 2018). Over the years the erosion process has slowly shifted from east to west, necessitating the expansion of foreshore protection efforts in the same direction. The initial protective structures at Sandy Point were constructed in the late 1950s. Foreshore revetments made of either rock or geobags are present along Sandy Point and the western section of Conroy Park.

East of Sandy Point, rock groynes were also built to intercept a portion of the sand being transported westward. Over the past two decades, the erosion issue has become particularly pronounced at Conroy Park. This is supported with analyses indicating that sand tends to move from the eastern end to the western end of the foreshore at a rate of 1,750 m^3/year (Whitehead & Assoc., 2018), causing widening of the western section of Corlette Beach, adjacent to The Anchorage marina.

The following erosion and sedimentation issues were identified from the existing studies (Whitehead & Assoc., 2018; BMT, 2021a; and BMT 2021b):

- The build-up of sand has impacted seagrass and caused burial of two stormwater outlets adjacent to The Anchorage breakwater in Precinct 1.
- Erosion has caused severe undermining behind the geobag revetment near Conroy Park, resulting in the loss of some trees.
- In Precinct 3, incoming swell waves hit the shoreline at a sharp angle, causing erosion that has removed most of the sand and the steep foreshore revetment lacks proper structural support and adequate armour, making it highly prone to slumping.
- In precincts 4, 5 and 6, the narrow sandy beaches vary in location and size depending on wave direction (a rotation from west to east is observed following periods of westerly wind waves). In these precincts (primarily precincts 4 and 5), wave overtopping has caused scouring/slumping of the land surface immediately behind the revetment and also caused failure to the foreshore revetment (e.g., slumping in some sections).

The gradual and fragmented approach to foreshore protection along Conroy Park and Sandy Point, focusing on individual properties, does not offer adequate protection from wave action to all residential properties and public assets.

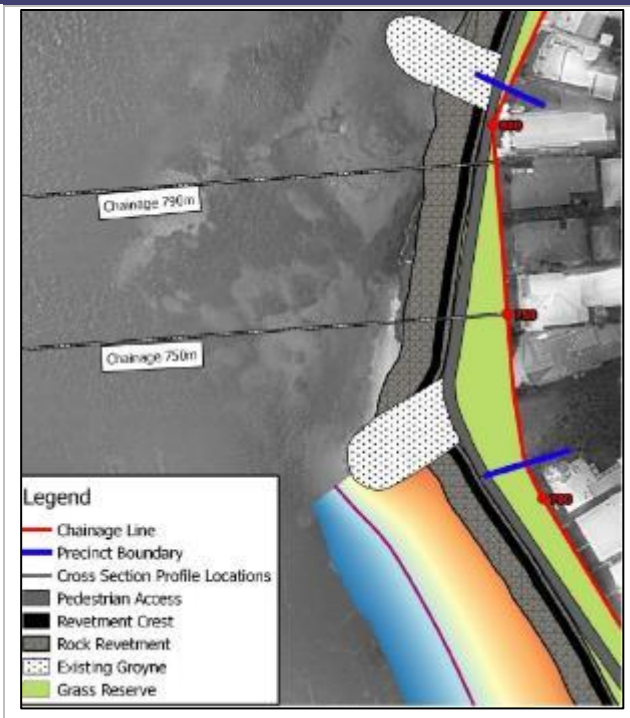
This management option proposes to progress recommended priority options 2, 4 and 7 for Precincts 4, 5 and 6 from Table E3 in the Sandy Point / Conroy Park Foreshore Erosion and Drainage Management Plan (Whitehead and Assoc., 2018), including:

- Priority option 2 – Construct robust revetment in Precinct 5. This would require removal of all unauthorised access ways and boat ramps to ensure the integrity of the revetment and minimise risk from wave overtopping. Some reclamation may be required;
- Priority option 4 – Demolish foreshore protection and re-construct revetment in Precinct 4; and
- Priority option 7 – Replace existing foreshore protection works with a new, continuous revetment in Precinct 6. This would require removal of all unauthorised access ways and boat ramps to ensure the integrity of the revetment. No work is proposed for the existing groyne.

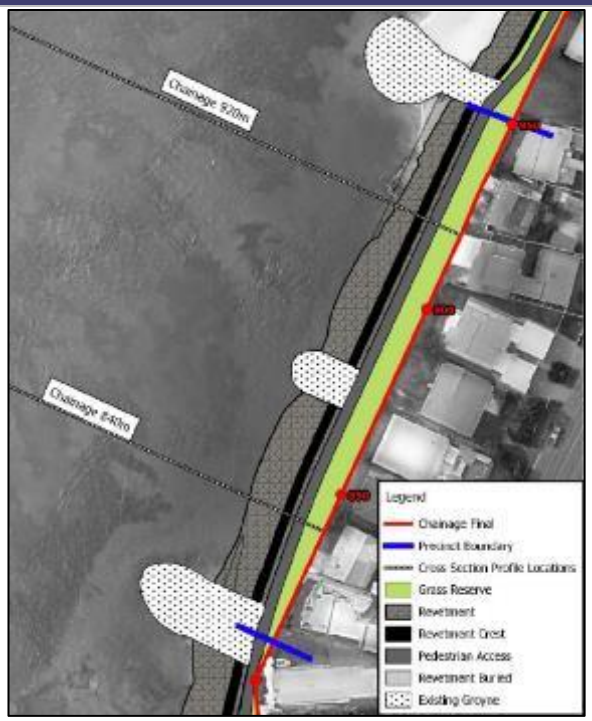
Figures are provided below, reproduced from Whitehead & Assoc. (2018), illustrating these options.

Initial studies would be undertaken to determine if a protection structure could be designed to be stable for a 100-year ARI event which has a 39% probability of occurrence over a 50-year design lifetime, subject to adequate monitoring and repairs are conducted. This option provides for investigations, detailed design and costing for a new coastal protection structure east of Sandy Point.

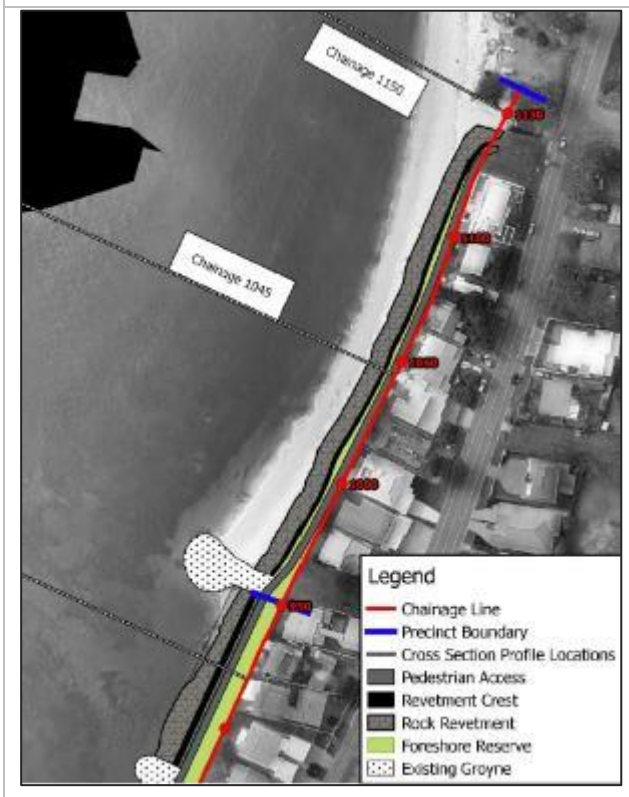
Option CH022 – Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park



Priority Option 4, Precinct 4 (source: Whitehead & Assoc., 2018)



Priority Option 2, Precinct 5 (source: Whitehead & Assoc., 2018)



Priority Option 7, Precinct 6 (source: Whitehead & Assoc., 2018)

The intent of this option is that it progresses the detail required to implement the proposed works sufficiently that they are 'shovel ready' and could be subjected to a CBA for a grant application in the next (2035-2045) Port Stephens CMP. The progression of these works to a CBA for the next CMP is reliant on the completion of Option CH072 – Coastal erosion hazard investigation for the Inner and Outer Port. The coastal erosion hazard lines that are an output of the hazard investigation are required to determine the level and timing of risk from coastal erosion and also the identification of beneficiaries of such

Option CH022 – Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park

works (distribution analysis, which forms part of the economic assessment), consistent with the requirements of the CM Act and CM Manual.

In the interim, the CZEAS will consider any actions required to protect public infrastructure at risk from shoreline erosion at Sandy Point and Corlette.

CMP Assessment:

Benefits:	• Provides an opportunity to remove existing unauthorised structures that increase risk from wave run-up and overtopping. • Opportunity to consider design options to minimise the impacts of the works on the environment. • Enables develop of a 'shovel-ready' project ready for implementation in the next CMP (2035-2045).
Disadvantages:	• The coastal erosion hazard extents have not been quantified for this location, and therefore the timing and magnitude of risk to public and private land is not at this time known. • In order to obtain funding under the NSW Coastal and Estuary Management Program, the coastal erosion hazard extents and a detailed CBA are required to apportion the cost of implementation to identified beneficiaries.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed to commence in Year 6 of the CMP, which aims to have the detailed design of the works completed in time to input into the next (2035-2045) CMP.

Related management options:

- CH023 – Undertake maintenance/repairs to the existing rock revetment.
- CH072 – Coastal erosion hazard investigation.
- RA016 – Sand carting.

Option CH023 – Undertake maintenance works / repairs to the existing rock revetment

Location(s): Eastern revetment at Sandy Point

Coastal threat(s) to be addressed: Coastal erosion, shoreline recession.

Cost: The capital cost of this option is estimated at $1,156,500, including:

- $20,000 for studies,
- $35,000 for preparation of an environmental impact assessment and to obtain the necessary permits and approvals;
- $1,096,500 for the construction works.
- The annual ongoing costs relate to monitoring of the structure and repairs budgeted at $16,500.

Option Description: The detailed summary for Option CH022 provides information on the history of works and previous studies undertaken for this location.

The existing rock and concrete block coastal protection structures located east of Sandy Point (see figure above) were rated at immediate risk of failure and requiring immediate repairs (BMT WBM, 2021). Maintenance of existing coastal protection structures is required to prevent further damage to the structure and temporarily reduce coastal risk level until new priority options are progressed (see Option CH022).

Given the extent of damage and urgency of required action to reduce coastal risk, a cost and time efficient approach is recommended consisting of building a rock toe protection made of rocks at the base of existing structures until a more permanent approach is determined (see Option CH022).

This management option proposes:

- A temporary toe rock protection constructed along the 420 m long coastline section east of Sandy Point, including the eastern and western groynes.
- Rock is well suited for this temporary shore protection works where the water depths are very shallow and local quarries can supply rock in sufficient quantities (i.e. Boral (Seaham) or Hunter Quarries).
- Rock of similar size of existing would be recommended. Rock would be placed as a double rock layer of 2 to 3 stones wide at the base of the existing protection structure.
- Construction duration within 1 to 2 months under normal conditions (i.e. no shortage of material).

In the operational phase, regular visual inspection of the structure would be recommended to monitor potential damage to the revetment including overtopping induced damage and scouring. Inspection is recommended once every year and following any significant extreme events.

The temporary protection structure could be designed to be stable for a 10-year ARI event which has a 39% probability of occurrence over a 5-year temporary design lifetime, subject to adequate monitoring and repairs are conducted.

The photo below is of the existing rock revetment on the eastern shoreline of Sandy Point, which is the subject of this option.

CMP Assessment:

Benefits:	• Provides improved structural integrity for the existing revetment with respect to its ability to withstand coastal processes.

Option CH023 – Undertake maintenance works / repairs to the existing rock revetment

Disadvantages:	• The construction details of the existing structure are not documented or known. As such, any remedial works may be susceptible to weaknesses in the existing structure. • The existing structure is an abandoned asset and therefore the management responsibility is unknown.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed to commence in Year 2 of the CMP, with ongoing annually recurrent costs applied every year thereafter.

Related management options:

- CH022 – Progress investigations and detailed design of priority options from Whitehead & Assoc. (2015)
- CH072 – Coastal erosion hazard investigation.
- RA016 – Sand carting / beach nourishment.

Option RA016 – Sand carting / beach nourishment at Corlette Beach

Location: Corlette Beach and Conroy Park, Sandy Point

Coastal threat(s) to be addressed: Beach erosion, shoreline recession.

Cost: The capital cost of this option is estimated at $122,500, including:

- $42,500 for an environmental impact assessment and permits and approvals (and including Traditional Owner engagement for due diligence assessment purposes), as well as a detailed design study of sand carting works to fine-tune the operations based on previous experience (e.g., definition of sand trigger levels);
- $80,000 for the sand carting contractor, including $5,000 for site establishment and assuming $5/m^3 of sand transported.
- The annual ongoing costs relate to maintenance and are budgeted at $10,000.

Option Description: The option description for CH022 above provides a summary of the sediment transport processes affecting this site. The photos below show the foreshore condition in 2023.

The ongoing shoreline erosion is presenting a risk to public safety, with the foreshore at this location a popular thoroughfare. In addition, the recreational access and amenity of the beach near Conroy Park is impacted by reduced beach volume and width. This option proposes sand carting to move accumulated sand from the western end of the beach next to The Anchorage breakwater (shown in yellow in the figure below) further to the east (placement area shown in orange in the figure below) to enable it to be gradually transported eastward in front of Conroy Park to provide improved amenity value and prevent burial of stormwater outlets at Corlette Beach. It is a form of beach nourishment. A co-benefit of this activity is short-term coastal protection.

The option would involve an initial transport of 15,000 m^3 of sand, followed by up to around 2,000 m^3 (or 4,000 m^3 every two years) or when a trigger level (e.g., beach volume) is met.

Option RA016 – Sand carting / beach nourishment at Corlette Beach

CMP Assessment:

Effectiveness:	• The works would be effective over the short to medium term in addressing shoreline erosion arising from sediment transport processes. The sand would gradually be transported from the east back to the west and accumulate again near the marine breakwall, hence the requirement for repeated carting of smaller volumes of sand.
Benefits:	• Provides improved recreational amenity for visitors to the beach.
Disadvantages:	• Requires ongoing commitment on behalf of Council to maintain the works, particularly in relation to episodic erosion events. • Short-term temporary disruption to beach users and nearby residents.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed to commence in Year 3 of the CMP.

Regular sand placement would need to balance the longshore sand transport. Frequencies of operations would depend on when sand level triggers are reached to balance ongoing erosion in precincts 2 and 3 and prevent burial of stormwater outlets at Corlette Beach.

Related management options:

- CH022 - Progress investigations, detailed design and costings for priority options from the Whitehead and Assoc. (2015) Management Plan for Sandy Point/Conroy Park, namely, to demolish existing structures and construct new coastal protection works in Precinct 3, 4 and 5.
- CH023 - Undertake maintenance works / repairs to the existing rock revetment.

Option RA036 – Minor shoreline re-profiling and landscaping works at Kangaroo Point

Location(s): Kangaroo Point

Coastal threat(s) to be addressed: Encroachment on public land, shoreline recession.

Cost: The capital cost of this option is estimated at $233,000, including:

- $49,000 for initial studies, including an environmental approval and permits (and including Traditional Owner engagement for due diligence assessment purposes) and beach profile survey;
- $5,000 for beach scraping works;
- $8,300 for coir logs (placement at toe, 2 coir logs of 0.2m height stacked);
- $87,500 for plants; and
- $37,500 for sediment controls.

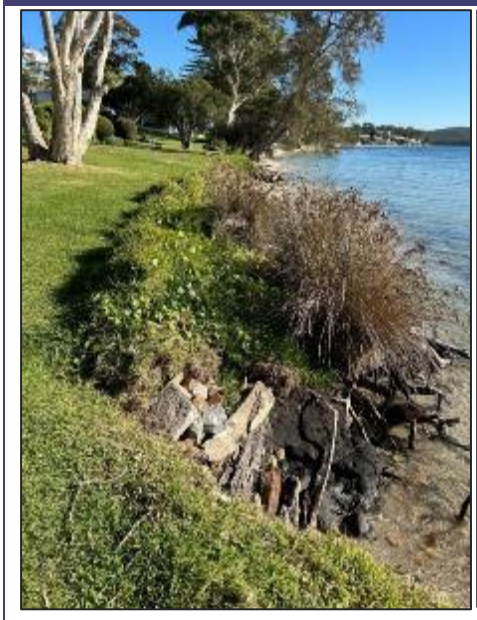
Ongoing annual maintenance (e.g., replacement of around 25% of plants, on average, plus weeding) is estimated at $21,875 per year.

Option Description: There are a large number of foreshore structures along the shoreline at Kangaroo Point, including a range of ad hoc structures. It is evident that improper fill was used at some time in the past, as visible in the eroding shoreline (see photos below), whether for backfilling or reclamation. The Kangaroo Point Foreshore Study (Whitehead & Assoc., 2015) considered a range of options to address the ongoing erosion and damage to foreshore structures at Kangaroo Point. Following the study, in 2017, a timber wall structure was removed and drainage constructed to collect private property stormwater and discharge it via the stormwater network to address the associated erosion issues.

In recent years there has been ongoing erosion of the shoreline resulting in the undermining and loss of some trees along the foreshore (see photos below). The beach width at this location is also very narrow, much narrower than the beach further to the west. In addition, the public accesses the waterway at various locations along the shoreline (including launching watercraft) and this is in some locations exacerbating the shoreline stability issues.

Of interest is the presence of coffee rock, visible as darker consolidated material in the photos below, which is currently acting to stabilise the shoreline somewhat.

Option RA036 – Minor shoreline re-profiling and landscaping works at Kangaroo Point

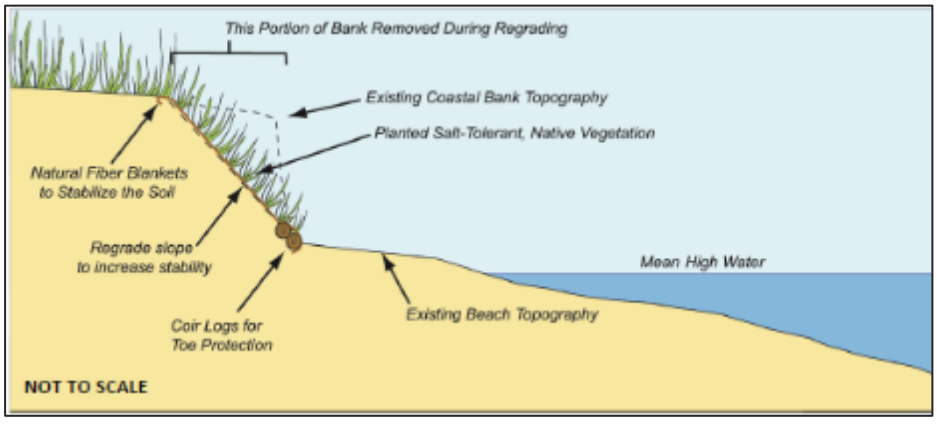



This option proposes stabilising the foreshore using a nature-based solution to arrest the shoreline erosion and improve beach access and amenity along a roughly 120 metre section of shoreline where the timber wall was previously located. A co-benefit of this activity is short-term shoreline protection.

The works would involve:

- Shoreline re-profiling using a small bulldozer and placement of natural filter blankets over the reconstituted slope for stabilization. Beach scraping would be required in some areas to preserve existing trees and ensure a smooth plan layout of the shoreline. Sand would be pushed from around Mean Sea Level (MSL) to the top of the beach to reconstitute the dune profile (about 500 m^3 or about 4 m^3 per linear metre over the 120 m long section would allow an averaged one metre extra width of foreshore). Transitions with the stormwater outlet would be designed ensure no obstruction of stormwater discharge flow and reduce “edge effects”.
- Placement of coir logs at the base of the reconstituted foreshore to limit scour by waves and promote vegetation establishment. Coir logs allow vegetation to grow within them. As they slowly biodegrade into their environment, they become part of the soil that supports vegetation growth.
- Planting and sediment controls on about 2,500 m^2 leeward of the coir logs (approximately 10 to 15 m wide along the 120 m long beach section). Standard re-vegetation at four plants per square meter with infill of mature stock (300 mm pot size), watered for 10 weeks. Average erosion sediment controls include jute mesh.
- The intent of the vegetation is to preclude access except at select locations.

A general schematic of the proposal is provided below, sourced from https://www.northeastoceancouncil.org/.



CMP Assessment:

Effectiveness:	• The works are effective over the short to medium term in addressing shoreline erosion arising from public access and coastal processes.

Option RA036 – Minor shoreline re-profiling and landscaping works at Kangaroo Point	
Benefits:	• Reduces impacts of public access on foreshore vegetation and stability. • Supports foreshore stability and improves habitat value.
Disadvantages:	• Requires ongoing commitment on behalf of Council to maintain the works, particularly in relation to episodic erosion events. • Short-term temporary disruption to beach users and nearby residents.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response
Timing: The option has been programmed for Year 7 of the CMP, with ongoing annual maintenance thereafter.	

Option CH005 – Adaptation strategy for Tilligerry Peninsula

Location(s): Tanilba, Mallabula, Lemon Tree Passage, Oyster Cove

Coastal threat(s) to be addressed: Primarily coastal inundation and tidal inundation.

Cost: Provides for the preparation of an adaptation plan and associated modelling, civil design and community and stakeholder engagement. This has been estimated at a cost of $200,000.

Option Description: There are extensive areas of low-lying land adjacent to Tilligerry Creek and along the Port Stephens foreshore that are vulnerable to inundation due to elevated estuary water levels. The coastal hazard modelling undertaken by BMT (2021a) in Stage 2 of the CMP showed that large areas of the Tilligerry Peninsula will be inundated several times a year by 2120 due to sea level rise; that is, these areas are below the 2120 tidal inundation level (HAT) shown in blue on the map below. The modelling also identified that, by the year 2120, an even larger area of low-lying land would be impacted by coastal inundation during a 100-year ARI storm, shown in green on the map overpage.

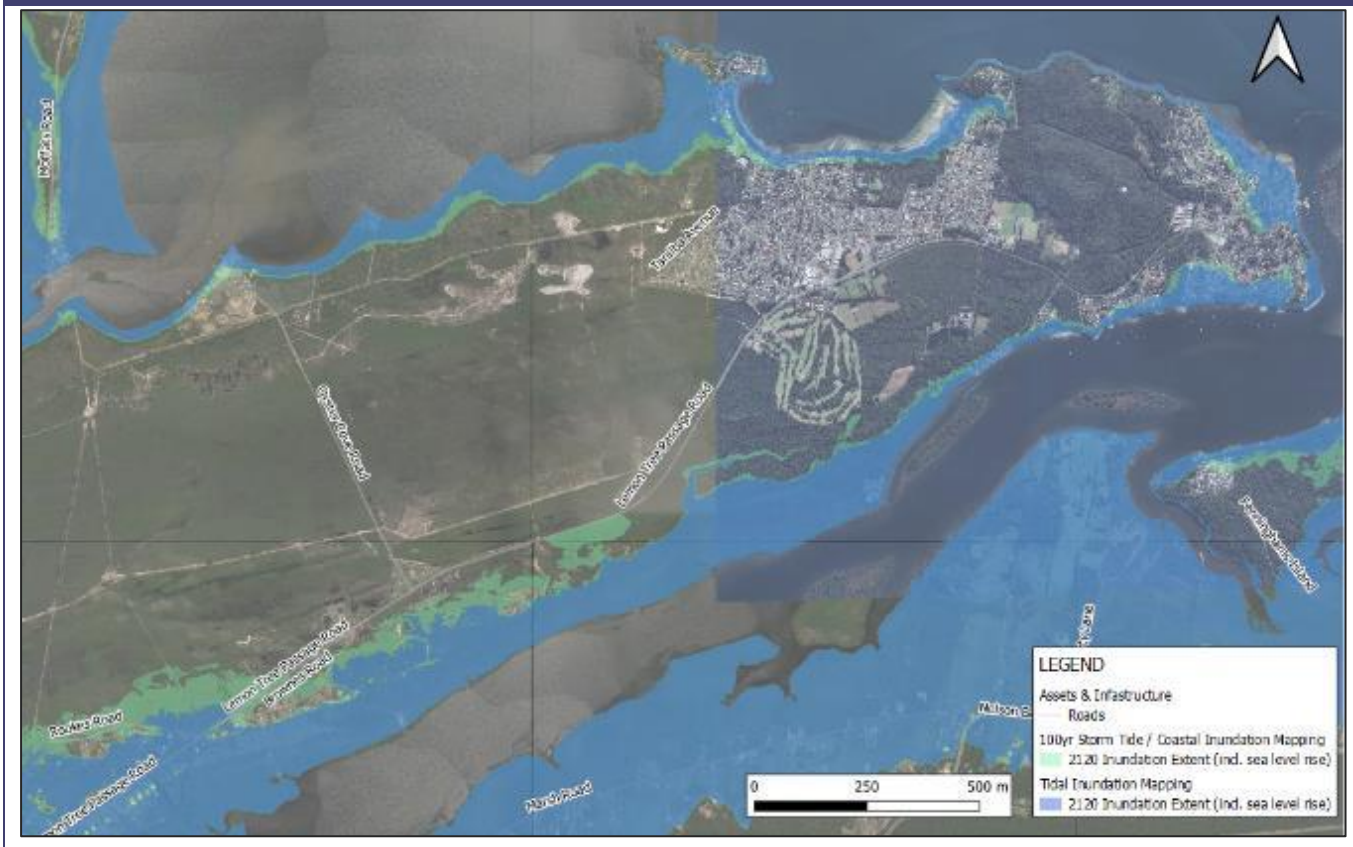
This frequency of inundation represents an unacceptable level of risk with respect to public and private assets and public safety. It is understood there are also a number of development proposals being considered that would result in an increased development intensity within this area.

The key impacts of tidal and coastal inundation on the Peninsula would likely include:

- Loss of (or decline in) functionality of infrastructure due to rising groundwater levels (e.g., stormwater or sewage infrastructure);
- Increased maintenance costs due to deterioration of materials (e.g., road pavement, foundations);
- Short-term and eventually permanent loss of access along key access roads including Lemon Tree Passage Road, Rookes Road, Oyster Farm Road, John Parade, Cook Parade and Tanilba Avenue. In particular, the headland at Tanilba and including Wundabalaynbah Point would at some time become an island inaccessible from the Peninsula;
- Loss of public open space areas, in particular along the estuary foreshores, and loss of recreational assets such as Tanilba boardwalk;
- Safety risks associated with electrical services; and
- Debris impacts and wave loading associated with coastal inundation.

These impacts, if left unmitigated, would render parts of the Peninsula uninhabitable.

Option CH005 – Adaptation strategy for Tilligerry Peninsula



It is likely there are also a range of Aboriginal cultural heritage values associated with the Tilligerry Peninsula, including both tangible and intangible heritage, cultural sites, totems and resources. These values could be placed at risk due to tidal inundation.

The tidal inundation mapping prepared by BMT (2021a) highlights that the level of risk will increase over time and an adaptation strategy would provide an avenue to consider the appropriate balance between protection of public, private, natural and cultural assets.

Adaptation planning should consider the ongoing viability of the current uses of the land and which values or uses the community would like to maintain in the long-term based on the risk appetite of the community, land owners and managers. The risk to private development may require a combination of adaptation and mitigation options such as relocation of assets and changes to land use, filling and raising of assets and roads and property development controls.

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

- Interactions between catchment flooding and coastal and tidal inundation (joint occurrence);
- Potential impacts of tidal inundation and any adaptation strategies on Aboriginal cultural heritage and values;
- A range of engineering mitigation options to reduce risk to property such as levees, filling of land, drainage improvements, planned relocation, house raising, etc.;
- Where filling of the land is proposed, access to imported fill;
- Land acquisition or land swaps;
- Design to tie into existing surrounding ground levels;
- Maintenance of property access (i.e., driveways) and management of inter-lot drainage for retained properties;
- Ongoing provision of services and the need for utility relocations or modifications (e.g., stormwater, potable water, sewage, telecommunications and electricity);
- Drainage improvements for local rainfall events;
- A costed adaptation pathway (sequence of works and timeframe); and
- Multi-stakeholder involvement.

CMP Assessment:

Option CH005 – Adaptation strategy for Tilligerry Peninsula

Benefits:	• Enables improved understanding of the impacts of climate change on the peninsula, particularly with respect to joint occurrence events (e.g., combined catchment flooding and coastal inundation due to an east coast low). • Facilitates improved community understanding of the hazards and risk, and discussion on acceptable and unacceptable levels of risk to built, natural and cultural assets. • Facilitates planning for and coordination of a response by the various relevant stakeholders.
Disadvantages:	• It may be difficult to address all views in the community or amongst the stakeholders on the preferred risk management strategy. • The benefits are likely to be accrued primarily in the long-term, whereas the cost may be incurred primarily in the short to medium-term.
Option Type:	☐ Alert ☐ Avoid future impact ☐ Active intervention ☒ **Planning for change** ☐ Emergency response

Timing: The adaptation strategy would need to identify 'Thresholds' or 'Triggers', which represent a point at which the level of impact from tidal inundation becomes unacceptable and a different adaptation pathway is adopted. These would be established during development of the adaptation pathway. However, for the purpose of CMP planning, it is apparent that frequent inundation of low-lying properties in Lemon Tree Passage would likely occur by 2070. This may be considered the threshold where these locations begin to lose their liveability. The trigger point for this threshold would require analysis of the timeline between when the threshold is reached and when the response is required (i.e., the time available to implement the response). This analysis would include consideration of a monitoring period, response time, and a safety buffer for uncertainty.

In order to adequately plan, prepare and implement adaptation, the planning should commence as soon as possible. It is currently programmed for Year 6-7 of the CMP. The preparation of an adaptation plan at a concept stage has been included in this CMP. If the concept stage plan identifies the need for more detailed planning, this would then proceed, or be considered in the revision of this CMP if more than 10 years has passed.

Related management option: CH001 – Coastal hazard monitoring strategy.

There were also a number of options identified in the long-list of options that did not proceed beyond the feasibility assessment due to the need to develop a holistic adaptation strategy. These may be re-visited during the development of the adaptation strategy, where appropriate. They include the following options:

- CH034 - Establish trigger points for adaptation;
- CH035 – Flood gates to prevent tidal inundation;
- CH039 – Artificial berm to prevent coastal inundation; and
- CH046 – Bund to prevent coastal inundation.

Option E012 – Ongoing program of beach maintenance and dune rehabilitation works for all coastal foreshore land managed by Council (also referred to as the 'sand management Option')

Location(s): Birubi Point, Boat Harbour, One Mile Beach, Fingal Bay Beach, Little Beach, Nelson Bay, Lemon Tree Passage, and Tanilba.

Coastal threat(s) to be addressed: Encroachment onto public land, biosecurity risks, beach erosion, aeolian sand inundation.

Cost: The annual cost of these activities has been estimated at $140,000 (in total across all sites) based on information provided by Council and provides for contractors to assist with dredging, sand carting and beach scraping. This annual cost includes $20,000 to undertake annual beach surveys to evaluate sand movement. Further, it is assumed that an environmental impact assessment and any required permits, licences and approvals would need to be undertaken every 5 years (i.e. Years 1 and 6) at a cost of $50,000.

The details of the annually recurrent cost estimates for each of the sand management activities are provided in **Appendix D**.

The capital cost associated with this option, estimated at $25,000, provides for analysis of the sand at the sources and placement sites be undertaken to evaluate suitability of the material for its intended re-use with respect to particle grain size distribution and contamination status.

Option Description: The aim of this management option is to maintain beaches and associated dune systems for environmental protection and public safety purposes. The foreshores are subject to a range of coastal processes and this option provides for management of the resultant impacts on recreational access and amenity. The impacts may include:

- Erosion around boat ramps, creating a drop off and making access difficult;
- The accretion of sand in car parks and around SLSCs due to aeolian sand transport;
- The undermining and/or erosion of public accessways due to coastal erosion or stormwater impacts, affecting paths, beach accessways, stairs and boat ramps resulting in loss or reduction in access and negatively impacting SLSC operations; and
- Reduced recreational amenity (beach width and volume) due to coastal erosion, whether due to an event or an ongoing deficit of sand.

The photos below provide some examples of these issues. All photos are sourced from Council.

Nelson Bay Foreshore Reserve

Stormwater outlet undercutting an accessway at Fingal Bay

Option E012 – Ongoing program of beach maintenance and dune rehabilitation works for all coastal foreshore land managed by Council (also referred to as the 'sand management Option')

Before and after photos showing placement of sand to address undermining of stairs at Nelson Bay Beach. The sand was sourced via dredging of Little Bay boat ramp, where accreted sand was impacting the use of the boat ramp.

Sand accretion at Birubi Point SLSC due to aeolian transport.

The photos below, provided by Shoalhaven City Council, provide examples of beach scraping works.

The frequency at which sand management is required varies for each individual site depending on the weather conditions (e.g., in relation to seasonal erosion events or periodic storms) and coastal processes. **Appendix D** details all the activities that fall under this option.

Option E012 – Ongoing program of beach maintenance and dune rehabilitation works for all coastal foreshore land managed by Council (also referred to as the 'sand management Option')

CMP Assessment:

Effectiveness:	• The works are effective over the short to medium term in addressing risk to public safety due to erosion at accessways.
Benefits:	• Reduces impacts of erosion and aeolian sand transport on beach access and amenity, and on built and natural infrastructure. • Mitigates impact of erosion and accretion cycles on use of boat ramps. • Mitigates impacts stormwater-induced erosion.
Disadvantages:	• Requires ongoing commitment on behalf of Council to manage cycles of erosion and accretion. • Short-term temporary disruption to beach users and nearby residents. • Localised direct impact to benthic infauna in dredge, sand placement and beach scraping areas. Rapid recovery expected. • Short-term water quality impacts during works.
Option Type:	☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response

Timing: The option has been programmed as an ongoing program of works undertaken annually, noting not all activities under this option would be undertaken every year. The trigger for undertaking individual activities is largely observational, but could be supported by beach monitoring under Option CH001.

Related management options:

- RA045 – Maintenance dredging.
- CH077 – Supported dune recovery following erosion events.
- E001 – Pest and weed management in the coastal zone.
- E016 – Encourage and facilitate local volunteer groups to support dune rehabilitation activities.

Option RA045 – Maintenance dredging activities

Location(s): Little Beach, Nelson Bay, Taylors Beach and Soldiers Point.

Coastal threat(s) to be addressed: Marine sand inundation.

Cost: The estimated cost of implementation of this option has been developed based on the details provided in below and is estimated at $174,500 in the first year, with an average of $50,600 each subsequent year.

Option description: This section provides details for each of the proposed dredging activities. The sand sourced via dredging may be beneficially re-used, where appropriate (e.g. via nourishment activities identified in Option E012).

Little Beach

Dredging of sand from below MHWM around the boat ramp. This activity is triggered by the building up of sand on the boat ramp and is undertaken around 8 times each year and is assumed to cost around $1,000 each time, to a total annual cost of $8,000. Typical volumes of 80-100 m^3 are dredged, and the sand is placed downdrift of the boat ramp, or if it is not required in this location, placed on Nelson Bay Beach adjacent to the splash park where erosion occurs.

Nelson Bay Marina (refer map overpage)

1. Dredging is undertaken every two years on average at a cost of around $62,500 each time.
2. Where appropriate, the sand may be placed on the adjacent beach within the marina.

Soldiers Point Boat Ramp

Option RA045 – Maintenance dredging activities

Dredging is undertaken every five years at the boat ramp using an excavator from the toe of the ramp at a cost of around $100,000 (assuming 10,000 m^3 at $10/$m^3$). The dredging is required because bigger boats accessing the ramps bottom out due to accumulation of sand.

Taylors Beach Boat Ramp

Dredging (including debris removal) is undertaken once a year. Typically, around 50 m^3 of sand is dredged using an excavator and the sand is placed in front of the seawall where there are gaps. The cost is estimated at around $3,750 annually.

Timing: The trigger for undertaking dredging at each individual location is largely based on complaints received from the public, or from observations made by Council staff.

Related management options:

- E012 – Sand management option.

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