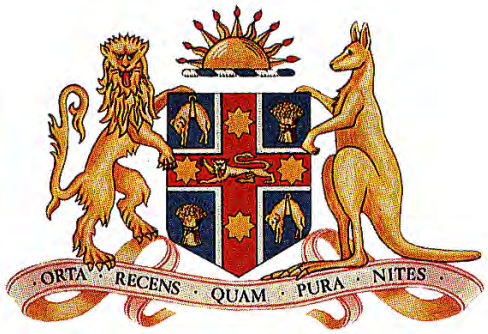

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Planning and Environment Notices

COASTAL MANAGEMENT ACT 2016

PUBLICATION OF COASTAL MANAGEMENT MANUAL

I, Gabrielle Upton, Minister for the Environment, in pursuance of section 21 of the *Coastal Management Act 2016* (**the Act**) hereby publish a manual relating to the management of the coastal environment of NSW, being the document entitled *NSW Coastal Management Manual* (April 2018) (**the Manual**) prepared by the Office of Environment and Heritage (OEH). The Manual takes effect from the date of publishing on the OEH website (3 April 2018).

This Manual replaces any manual or guidelines relating to the management of the coast that had previously been notified in accordance with section 55D of the *Coastal Protection Act 1979.*

The Manual is available on the Office of Environment and Heritage's website: www.environment.nsw.gov.au. Section 21(6) of the Act also requires that a copy of the Manual be available for public inspection, free of charge, on the websites of the Department of Planning and Environment (Department) and the Office of Environment and Heritage as well as at the offices of the Department and the Office of Environment and Heritage during ordinary office hours.


Our future on the coast
NSW Coastal Management Manual Part A:
Introduction and mandatory requirements
for a coastal management program
NSW
GOVERNMENT

Cover photograph:
White Sands WalkJervis Bay National Park (Photo: Michael Van Ewijk/OEH)

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Coastal management manual

The coastal management manual (the manual) has been prepared as a resource for local councils and public authorities to use when planning their future on the coast. It imposes mandatory requirements and provides guidance pursuant to the *Coastal Management Act 2016* (CM Act) when preparing, developing, adopting, implementing, amending and reviewing, and contents of, a coastal management program (CMP).

Structure and content of the manual

The manual has two parts:

Part A:

- provides an introduction and background to the coastal management framework in NSW, which is for guidance and not mandatory
- imposes the mandatory requirements for the preparation, development, adoption, implementation, amendment and review of a CMP in a series of numbered paragraphs from 1 to 19
- imposes the mandatory requirements for consultation in numbered paragraph 15.

- **Part B** provides guidance and information in connection with preparing, developing, adopting, implementing, amending and reviewing a CMP, including guidance on:
  - considering and promoting the objects of the CM Act
  - undertaking the adaptive risk management process that councils and public authorities are to follow when preparing a CMP to:
    - identify and assess risks to environmental, social and economic values
    - evaluate and select management actions to address those risks
  - undertaking studies to address information gaps, refining maps for management areas and supporting the preparation of a CMP
  - the preparation of coastal zone emergency action subplans
  - the contents of a CMP
  - the role of the Minister, public authorities and the NSW Coastal Council
  - integrating a CMP into the Integrated Planning and Reporting (IP&R) framework for local councils under the *Local Government Act 1993* and land use planning system.

NSW Coastal Management Manual Part A

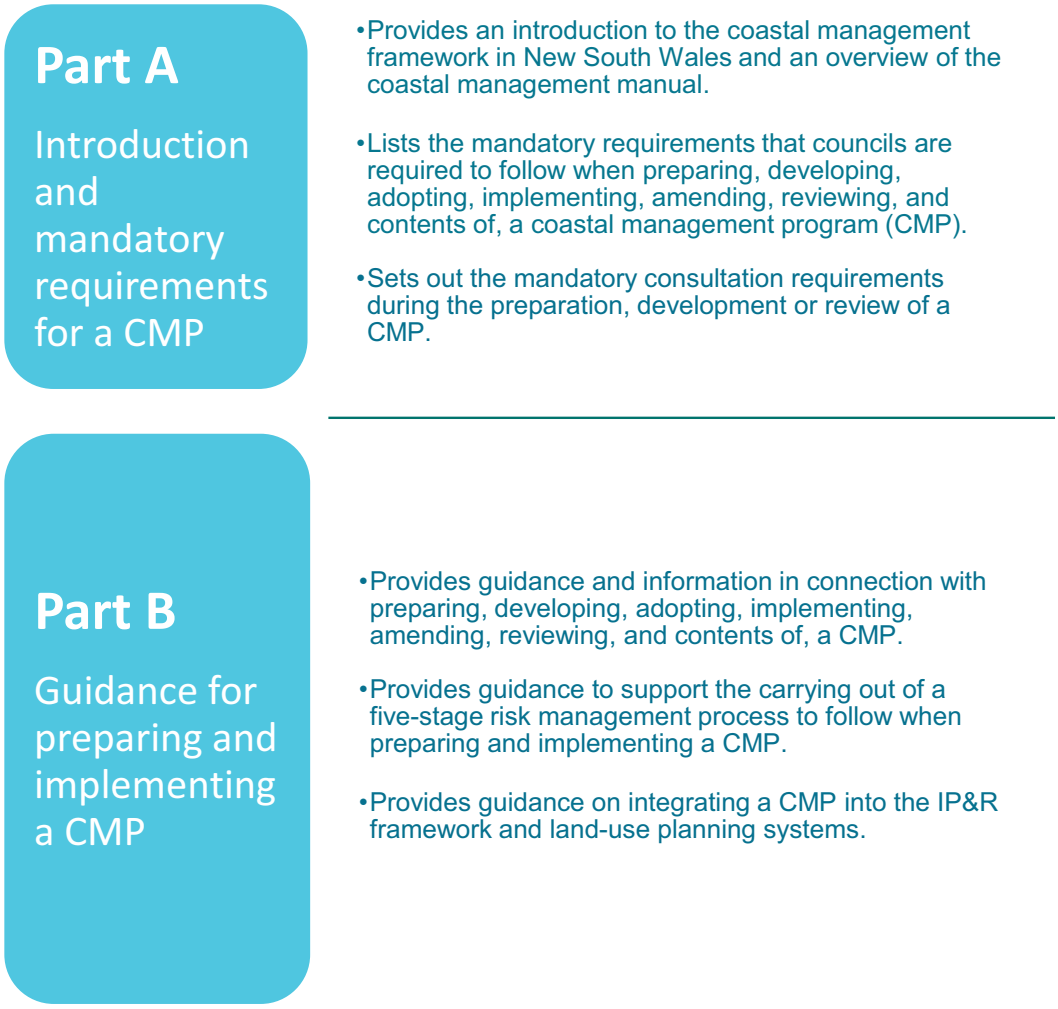

Figure A1 Components of the coastal management manual

Introduction

The importance of the coast

The NSW coast is one of our greatest assets. It is a diverse, complex and dynamic environment made up of beaches, dunes, headlands, cliffs, rock platforms, estuaries, coastal floodplains, coastal lakes and lagoons. The coast has unique values, natural and urban landscapes and cultural significance that support our vibrant, healthy and prosperous way of life.

The coastal landscape is under increasing pressure. Nearly 85% of the NSW population lives within 50 kilometres of the coastline and people are placing increasing value on a coastal lifestyle with access to beaches and coastal waterways. Major cities, regional centres and small coastal villages are continuing to grow. New South Wales is expected to be the home of 11 million people by 2040, of which a significant proportion will live close to the coast.

The coast is a vital economic zone that supports most of the state's industrial, transport and commercial activity. It also contains our iconic beaches and important coastal waterways, along with our marine protected areas and many of our national parks.

Recent NSW Government legislative and regulatory reforms seek to guide the management of the coast consistent with the principles of ecologically sustainable development and help ensure that New South Wales has thriving coastal communities living and working on a healthy coast now and into the future.

Figure A2 **Park Beach and Coffs Creek** (Photo: R Cleary, Seen Australia/OEH)

The coast is a dynamic and changing environment

The NSW coast is a dynamic and constantly changing environment. It has evolved over millions of years, responding to long-term geological processes and climate change. Wind, waves, ocean currents, river flows, sediment transport, sea level and storm events influence the nature of coastal landscapes over time.

A relatively narrow continental shelf, moderate wave climate, warm waters of the East Australian current, rocky headlands and clean quartz-rich sandy beaches help define the open coast. The southern and central sections of the NSW coast are generally characterised by numerous headlands that compartmentalise beaches whereas the northern coastline is typically characterised by longer exposed sandy beaches, sometimes backed by extensive dunes.

Estuaries in New South Wales generally reflect the differences in rainfall, geology and wave climate along the coast and may be categorised into three main types: drowned river valleys, barrier estuaries, and coastal lakes and lagoons that offer great beauty and utility.

Figure A3 **Lake Macquarie flood tide delta** (Photo: B Clout/OEH)

Aboriginal people have lived on the NSW coast for many thousands of years. They have found food and raw materials in the wide variety of coastal environments. Physical evidence of Aboriginal life and activity can be found along the coast. Aboriginal communities have traditional and cultural connections with the coast and continue to use the abundant coastal resources.

Since 1788 there have been waves of settlement of coastal areas that have utilised the natural resource base, e.g. timber harvesting and sand mining. Construction of port facilities has facilitated the opening of coastal lands to agriculture and waters to fishing and aquaculture. Road, rail and other infrastructure have enabled the expansion of coastal cities,

towns and villages. Demographic and socioeconomic change has been accompanied by increased tourism, commercial and industrial activity.

In some areas, past development has created social, economic and environmental legacies. Future population growth and changes in land use will add further development pressure that needs to be considered in planning and management of the coastal environment.

The variability of coastal processes and the ambulatory and dynamic nature of the shoreline can give rise to a range of potential coastal hazards and risks to the physical landscape and to the social and economic values of coastal communities. Climate change is a further factor in modifying the spatial patterns and intensity of coastal processes.

Figure A4 Erosion at Collaroy Beach, June 2016 (Photo: UNSW Water Resources Laboratory)

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

The manual seeks to facilitate ecologically sustainable development (ESD) in the coastal zone and promote sustainable land use planning decision-making.

This manual aims to encourage councils to think about how they might:

- avoid inappropriate development in areas exposed to high levels of risk from coastal hazards or directed towards areas of lower probability of hazards and risk
- achieve land uses where the impacts and risks can be mitigated and the development is necessary
- plan and design development to be safe without increasing the risks or threats elsewhere, and ensuring any residual risks are addressed.

The NSW Government is delivering a new legislative and regulatory framework to better equip coastal communities to respond to the dynamic nature of the coast and sustainably manage the coastal environment.

Figure A5 Coastal development at Kiama (Photo: J Lugg/OEH)

The framework for managing the NSW coast

Local councils and public authorities are required to manage their coastal areas and activities in accordance with relevant state legislation, policies and plans.

The framework for managing the NSW coast includes:

- *Coastal Management Act 2016* (CM Act)
- State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP)
- coastal management programs (CMPs) prepared in accordance with the NSW coastal management manual.

Figure A6 shows the new coastal management framework.

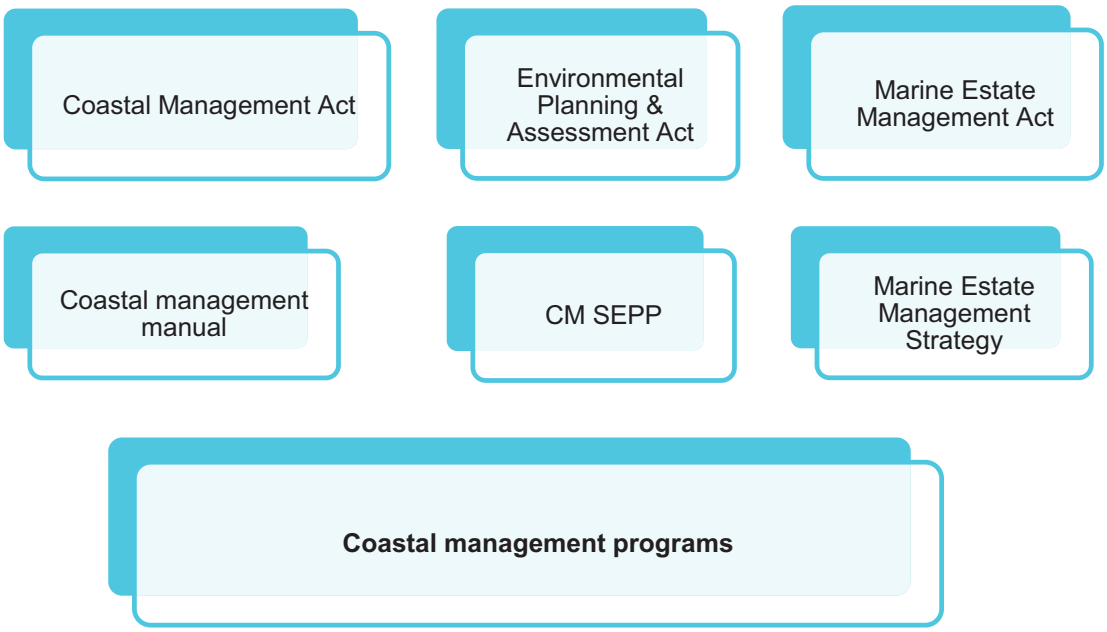

Figure A6 NSW coastal management framework

Other NSW legislation is relevant to the management of the environmental, social and economic values of the coastal zone, including:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Local Government Act 1993* (LG Act)
- *Crown Lands Act 1989* (which is to be replaced by the *Crown Land Management Act 2016*, some parts of which have already commenced and other parts which are to commence in 2018)
- *National Parks and Wildlife Act 1974*
- *Fisheries Management Act 1994*
- *Marine Estate Management Act 2014*
- *Local Land Services Act 2013*
- *Biodiversity Conservation Act 2016*.

Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act) provides for the integrated management of the coastal environment of New South Wales consistent with the principles of ecologically sustainable development, for the social, cultural and economic wellbeing of the people of the state. The objects are detailed below.

3 Objects of this Act

The objects of this Act are to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State, and in particular:

(a) to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, and

(b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and

(c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and

(d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and

(e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and

(f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and

(g) to recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to manage coastal use and development accordingly, and

(h) to promote integrated and co-ordinated coastal planning, management and reporting, and

(i) to encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events, and

(j) to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities, and

(k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and

(l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone, and

(m) to support the objects of the Marine Estate Management Act 2014.

The CM Act also:

- defines the NSW coastal zone as being made up of four distinct coastal management areas and sets out specific management objectives for each of the areas
- identifies the hierarchy of management objectives for the management areas where there is overlap
- sets out the purpose of a CMP and provides for a manual to guide the preparation and implementation of a CMP
- requires local councils to give effect to their CMPs through some aspects of the Integrated Planning and Reporting (IP&R) framework established in the *Local Government Act 1993* (LG Act) and through the preparation of planning proposals and development control plans under the *Environmental Planning and Assessment Act 1979* (EP&A Act)
- provides for public authorities to have regard to CMPs to the extent that they are relevant to exercising their functions, and in particular, to have regard to the manual, the CMP and the objects of the CM Act when preparing, developing or reviewing plans of management
- defines coastal sediment compartments and estuaries
- establishes the NSW Coastal Council as an independent coastal advisory body.

State Environmental Planning Policy (Coastal Management) 2018

The State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) seeks to balance social, economic and environmental interests by promoting a coordinated approach to coastal management, consistent with the objectives of the CM Act.

The CM SEPP outlines a range of development controls (including matters for consideration by a consent authority) that aim to help protect and manage sensitive coastal environments, manage risk from coastal hazards, and support appropriate urban development.

The CM SEPP identifies four coastal management areas that when combined, define the coastal zone. Separate development controls apply to each of the coastal management areas and focus on achieving specific objectives.

Coastal management areas may overlap and more than one set of development controls may apply to that land if there is no inconsistency between controls. In the case of any inconsistency, the CM SEPP sets out the priority order for these controls, from the highest to the lowest:

i coastal wetland and littoral rainforest area

ii coastal vulnerability area

iii coastal environment area

iv coastal use area.

It is anticipated that CM SEPP maps identifying coastal management areas will be modified in time by further environmental planning instruments (EPIs) as further information becomes available, including as a product of the CMP process.

Studies and modelling that councils may undertake as part of their CMP preparation process are valuable because they can be used as part of the preparation of a planning proposal or a draft Local Environmental Plan (LEP) that seeks to amend the maps of coastal management areas under the CM SEPP.

The four coastal management areas are:

- **Coastal wetlands and littoral rainforests area (CWLRA)** is land that displays the hydrological and floristic characteristics of coastal wetlands and littoral rainforest communities and lands adjoining those features.

  Development controls for the mapped CWLRA aim to continue existing protection for these important ecological communities. A CMP can identify development for the purposes of environmental protection works on CWLRA land that may be carried out by or on behalf of a public authority without consent.

Figure A7 **Coastal saltmarsh, Homebush** (Photo: P Laegdsgaard/OEH)

Figure A8 Littoral rainforest at Iluka rainforest reserve (Photo: N Cubbin/OEH)

- **Coastal vulnerability area (CVA)** is land which is subject to current and future hazards, as defined in the CM Act. Defining and applying specific controls to this area will build awareness of coastal hazards and inform land use decisions.

  Development controls for the CVA are concerned with managing risk to human life, infrastructure, and public and private property that may be impacted by coastal hazards, and ensuring that we do not create legacy issues for future generations to deal with.

  The NSW Government will continue to work with local councils and communities to ensure that coastal hazards identified in studies or plans prepared by or for council are further considered, and where appropriate, reflected in land use planning instruments.

Figure A9 **Road damaged by coastal erosion, Jimmy's Beach, Hawkes Nest** (Photo: P Davies/OEH)

- **Coastal environment area (CEA)** is made up of environmental features such as state waters, estuaries, coastal lakes and lagoons. It also includes land adjoining those features, including headlands and rock platforms. It aims to protect the values, assets and features of these waters and the natural features on the adjoining land.

  Development controls for the CEA aim to protect and improve natural coastal features, coastal waters and environmental values for places such as beaches, dunes, surf zone and undeveloped headlands.

Figure A10 **Public access way to Pretty Beach** (Photo: N Cubbin/OEH)

Figure A11 **Coastal cliffs, rock platforms and intertidal zones, Depot Beach** (Photo: J Yurasek/OEH)

- **Coastal use area (CUA)** focuses on lands adjacent to coastal waters, estuaries, coastal lakes and lagoons, where impacts of development on the use and enjoyment of the beaches, foreshores, dunes, estuaries, coastal lakes and lagoons, and the ocean, need to be considered.

  Development controls for CUA are concerned with ensuring appropriate urban development for coastal areas, considering urban design issues such as the bulk, scale and size of proposed development, water sensitive urban design, and preventing adverse impacts on scenic qualities, visual amenity and Aboriginal cultural heritage.

Figure A12 Aerial view of Caves Beach, showing part of the coastal use area and coastal environment area (Photo: B Clout/OEH)

The CM SEPP also sets out a range of other provisions, including some development controls and permissibility provisions relating to coastal protection works (CPWs). CPWs comprise beach nourishment activities or works, and 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.

A CMP is required to identify CPWs that are proposed to be carried out on land by, or on behalf of, a public authority within the area to which it applies.

Coastal management programs

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

Developing a CMP will help councils clearly identify and balance competing interests and priorities in the coastal zone. Management actions will consider the benefits from economic growth, development and public access to the coastal zone along with the need for protecting and enhancing coastal environments and managing the risk to human life and property.

Building on existing coastal management policies and plans

Risks associated with coastal hazards and threats to healthy coastal ecosystems, as well as the changing social character of coastal settlements, have long been recognised by the NSW Government and local governments as important challenges and opportunities to be addressed.

Many councils have previously prepared and implemented coastal zone management plans to address management issues for coastal lakes, estuaries or beaches, dunes and headlands. If a coastal zone management plan (including an emergency action subplan) was certified under the *Coastal Protection Act 1979*, the savings and transitional arrangements in Schedule 3 of the CM Act mean it will continue to have effect until 31 December 2021 unless replaced by a CMP prepared and adopted under the CM Act.

Councils may have also identified and mapped the spatial extent of vegetation communities, assets and coastal hazards. The process outlined in the manual allows council to build on existing information and previous achievements in coastal management and planning. It allows the previous work to be updated to ensure that coastal management continues to meet the state's objectives and remains effective for the benefit of local communities.

Scope of a CMP

Each council has different experience, issues, challenges and opportunities in coastal management. The scope of a CMP may be specific to local circumstances, the community and coastal environment and may depend on a range of factors including the:

- local management issues, challenges and opportunities identified for each coastal management area, including the spatial extent
- effectiveness of existing management approaches and land use planning instruments to address current and future challenges
- responsibilities and capacities of council, public authorities, communities and other stakeholders to address coastal management issues
- future population growth and development pressures
- risks and liabilities associated with coastal hazards and threats to coastal environments
- vulnerability of coastal assets, environments and social and economic systems
- potential opportunities to adapt to change and thereby enhance the resilience of natural features and coastal communities.

Preparation of a CMP

It is recommended that councils follow a five-stage risk management process for the preparation and implementation of a CMP (refer to **Figure A13**). Councils will report on progress, outcomes and achievements in line with reporting requirements under the Integrated Planning and Reporting (IP&R) framework.

Councils can choose to fast-track stages 2 to 3 (or parts of those stages) as outlined in Part B, Stage 1. Fast-tracking is only recommended where the management approach is performing well and key drivers of change have not passed thresholds for introducing a new approach.

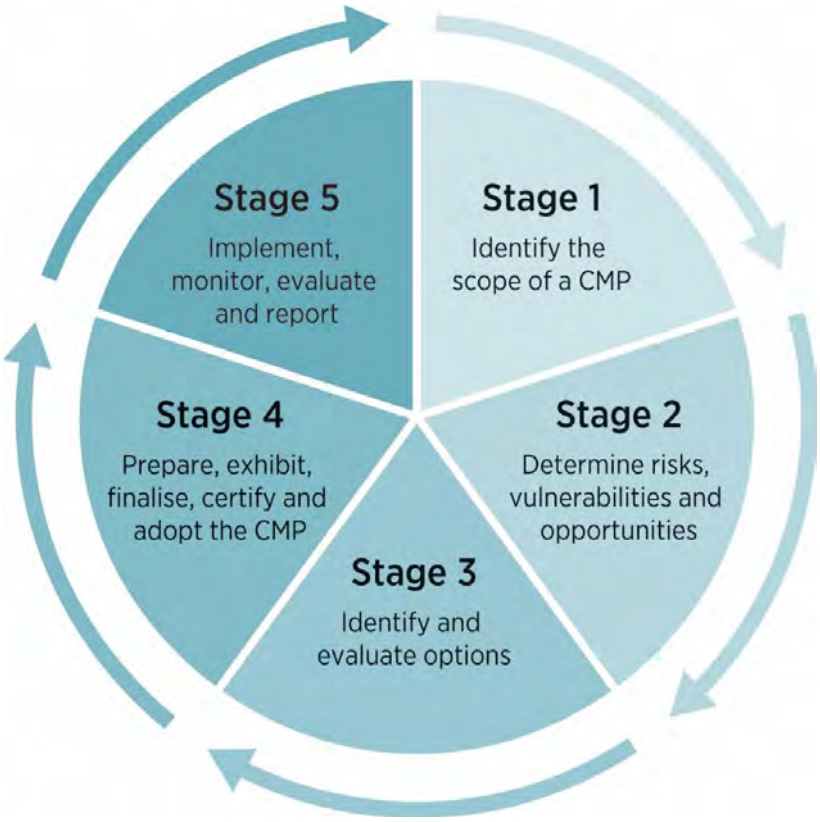

Figure A13 Stages in preparing and implementing a CMP

Roles and responsibilities

The CM Act (and other relevant legislation) establishes specific roles and responsibilities for relevant Ministers, the NSW Coastal Council, public authorities and local councils, as well as providing opportunities for communities to participate when preparing and implementing a CMP, as summarised in **Table A1**.

Table A1 Roles and responsibilities

Entity	Roles and responsibilities
Minister for the Environment	• Administers the CM Act • Gazettes the manual • May direct a council to prepare a CMP under the CM Act • May certify, or refuse to certify, a CMP • Appoints the NSW Coastal Council • May direct the NSW Coastal Council to undertake a performance audit of CMP implementation • May direct a review of the CM Act • Tables reports from the NSW Coastal Council in Parliament • May report a failure to comply with a directive to prepare a CMP • May prepare a CMP under certain circumstances
Minister for Planning	• Issues section 9.1 directions under the EP&A Act • Recommends the making or amendment of the CM SEPP including maps of the coastal management areas • May make Local Environmental Plans (LEP) that amend coastal management area maps in the CM SEPP (note if the planning proposal relates to the Greater Sydney Region, the Greater Sydney Commission makes the LEP, and if a Gateway determination authorises it, a council for its local government area may make the LEP)
NSW Coastal Council	• Provides independent and expert advice to the Minister • Oversees the effectiveness of coastal management • Provides advice to councils and public authorities if requested by the Minister • Provides advice on compliance by councils with the management objectives and the manual when preparing a CMP • Conducts performance audits of the implementation of local council CMPs and identifies opportunities for local council capacity building • Reports to the Minister about the outcomes of audits and makes recommendations on appropriate remedial actions
Office of Environment and Heritage	• Supports the Minister administering the CM Act • Prepares and updates the manual and any supporting material • Is a point of contact for local government or public authorities preparing and implementing a CMP • Provides advice on preparation and implementation of a CMP • Provides technical and financial support to implement coastal management in New South Wales • Provides advice to the Minister administering the CM Act

Entity	Roles and responsibilities
Other public authorities	• May participate in the preparation of CMPs when consulted • Before actions are identified in a CMP as their responsibility for implementation, or that affect their land or assets, they must agree to the action beforehand • Have regard to CMPs to the extent that they are relevant to exercising their functions, have regard to the manual, the CMP and the objects of the CM Act when preparing, developing or reviewing plans of management
Local councils	• Prepare a CMP in accordance with the requirements of the CM Act and the manual • May seek advice from public authorities or the NSW Coastal Council (through the Minister) • Consult with the community, relevant public authorities and adjoining councils when required • May prepare a planning proposal to amend mapping of coastal management areas • May make LEPs that amend coastal management area maps in the CM SEPP if a Gateway determination authorises it (note that otherwise if the planning proposal relates to the Greater Sydney Region, the Greater Sydney Commission makes the LEP, and for all other areas it is the Minister for Planning) • Identify cost and cost-sharing arrangements for implementing management actions • Implement the CMP through their IP&R program and/or land use planning system according to law • Monitor and report on implementation of the CMP • Assess certain development proposals within the coastal zone, and be a consent authority in certain circumstances, according to law

Mandatory requirements

Section 21 (2) of the *Coastal Management Act 2016* (CM Act) requires that this manual *'is to impose mandatory requirements and provide guidance in connection with the preparation, development, adoption, implementation, amendment, and review of, and the contents of, coastal management programs'.*

The CM Act itself also imposes requirements in connection with the preparation, development, adoption, implementation, amendment, and review of, and the contents of, coastal management programs. The mandatory requirements in this manual are in addition to those requirements.

Mandatory requirements

Mandatory requirements and guidance in this manual

1. In this manual:
   - i the numbered paragraphs of Part A are mandatory requirements within the meaning of section 21(2) of the CM Act;
   - ii the numbered paragraphs addressing consultation in Part A are also mandatory requirements within the meaning of section 21(2) of the CM Act and are the relevant provisions for the purpose of section 16(2) of that Act; and
   - iii all other content in Parts A and B provide guidance within the meaning of section 21(2) of the CM Act.

Purpose of a coastal management program

Statutory provisions

12 Purpose of coastal management programs

The purpose of a coastal management program is to set the long-term strategy for the co-ordinated management of land within the coastal zone with a focus on achieving the objects of this Act.

Mandatory requirements

The purpose, scope and focus of a CMP

2. A CMP is to consider a range of timeframes and planning horizons including immediate, 20 years, 50 years, 100 years and (if council considers it relevant based on expert advice) beyond.

3. A CMP is to consider a broad range of coastal management issues and management actions with a focus on achieving the objects and objectives of the CM Act.

Where and when a coastal management program is prepared

Statutory provisions

13 Requirement for coastal management programs

(1) A local council may, and must, if directed to do so by the Minister, prepare a coastal management program in accordance with this Part.

Note. See sections 20 and 30 regarding a failure of the local council to comply with a direction of the Minister.

(2) A coastal management program may be made in relation to the whole, or any part, of the area included within the coastal zone.

(3) A direction under this section may specify the time within which the direction must be complied with.

Mandatory requirements

The area that a CMP covers

4. A CMP must include the rationale for selecting the area to be covered by a CMP and identify whether it applies to:
   - i all or part of the coastal zone of one local government area; or
   - ii all or part of the coastal zone of adjoining local government areas that share a coastal sediment compartment or estuary (where adjoining local government areas share a coastal sediment compartment or estuary - refer to Schedule 1 of the CM Act - a CMP that addresses an area comprising that coastal sediment compartment or estuary must reflect this regional context).

5. A CMP must identify:
   - i any proposed amendments to mapping of the relevant coastal management areas;
   - ii evidence to support any proposed amendments or additions to the area of the four coastal management areas in the relevant area; and
   - iii information about these proposed amendments that can support the preparation of a planning proposal and, in particular, that could be forwarded along with a planning proposal to the Greater Sydney Commission (if the planning proposal relates to the Greater Sydney Region) or the Minister (for elsewhere) to inform a Gateway determination under section 3.34 of the EP&A Act.

How a coastal management program is prepared

Statutory provisions

14 Preparation of coastal management programs

(1) A local council is to prepare a coastal management program in accordance with the coastal management manual.

(2) The Minister may, by notice in writing given to a local council, direct the local council in its preparation of a coastal management program. A direction under this subsection prevails to the extent of any inconsistency between it and the coastal management manual.

Note. See sections 20 and 30 regarding a failure of the local council to comply with a direction of the Minister.

(3) In preparing a coastal management program, a local council must:

(a) consider and promote the objects of this Act, and

(b) give effect to the management objectives for the coastal management areas covered by the program, and

(c) consider the State and regional policies and plans prescribed by the regulations for the purposes of this section.

(4) A direction under this section may specify the time within which the direction must be complied with.

Mandatory requirements

Preparing a CMP

6. During preparation of a CMP, a council is to:
   - i identify the scope of the CMP;
   - ii determine and assess coastal risks, vulnerabilities and opportunities (including without limitation risks to environmental, social and economic values and benefits); and
   - iii evaluate and select coastal management options.

Note: These requirements correspond to the first three stages of the five-stage risk management process for the preparation and implementation of a CMP. These requirements are in addition to the specific requirements during preparation in the CM Act. Guidance for preparation is provided in Part B of this manual. Specific guidance on the requirements in (i)-(iii) above is given in Part B, Stages 1 to 3 respectively.

7. A council may choose not to repeat steps (or parts of steps) in subparagraphs (ii) or (iii) of mandatory requirement 6 for the area the subject of the proposed CMP (or parts of that area) if those tasks have already been undertaken for the coastal management of that area, provided that council first considers:
   - i whether the existing assessment of coastal risks, vulnerabilities and opportunities, or the existing evaluation of coastal management options, that council proposes to

rely on enables council to prepare the CMP in accordance with mandatory requirement 8 below and sections 14 and 15 of the CM Act;

ii the effectiveness of the existing coastal management of that area; and

iii whether any circumstances concerning the coastal management of that area have changed.

Matters to be dealt with in a coastal management program

Statutory provisions

15 Matters to be dealt with in coastal management program

(1) A coastal management program must:

(a) identify the coastal management issues affecting the areas to which the program is to apply, and

(b) identify the actions required to address those coastal management issues in an integrated and strategic manner, and

(c) identify how and when those actions are to be implemented, including those to be implemented by local councils under Chapter 13 of the Local Government Act 1993, those to be implemented under environmental planning instruments and development control plans under the Environmental Planning and Assessment Act 1979 and those to be implemented by public authorities (other than the local council), and

(d) identify the costs of those actions and proposed cost-sharing arrangements and other viable funding mechanisms for those actions to ensure the delivery of those actions is consistent with the timing for their implementation under the coastal management program, and

(e) if the local council's local government area contains land within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land, include a coastal zone emergency action subplan.

(2) A coastal management program may also include other matters as may be authorised or permitted by the coastal management manual.

(3) A coastal zone emergency action subplan is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event. For the purposes of this subsection, those roles and responsibilities include the carrying out of works for the protection of property affected or likely to be affected by beach erosion, coastal inundation or cliff instability.

(4) A coastal management program must not include the following:

(a) matters dealt with in any plan made under the State Emergency and Rescue Management Act 1989 in relation to the response to emergencies,

(b) proposed actions or activities to be carried out by any public authority or relating to any land or other assets owned or managed by a public authority, unless the public authority has agreed to the inclusion of those proposed actions or activities in the program.

Mandatory requirements

Key issues to be identified

8. A CMP must:
   - i provide a description of how the objects of the CM Act have been considered and promoted in preparing the CMP;
   - ii provide a description of how the objectives of the coastal management areas covered by the CMP have been given effect to in preparing the CMP;
   - iii identify the key coastal management issues affecting the areas to which the CMP is to apply and how these have been considered;
   - iv identify any coastal management actions required to address those key coastal management issues in an integrated and strategic manner;
   - v identify how the coastal management actions in (iv) have been considered and evaluated (including, without limitation, how council has evaluated the coastal management actions in light of the functions and responsibilities council has under legislation other than the CM Act);
   - vi identify any environmental protection works, on land identified as 'coastal wetlands' or 'littoral rainforests' on the Coastal Wetlands and Littoral Rainforests Area Map under the CM SEPP, that are proposed to be carried out by or on behalf of a public authority;
   - vii identify any coastal protection works that are proposed to be carried out by or on behalf of a public authority;
   - viii set out the recommended timing for the proposed coastal management actions;
   - ix identify a proposed monitoring, evaluation and reporting program in relation to the CMP, including by identifying key indicators, trigger points and thresholds relevant to the CMP; and
   - x include a business plan.

Requirements for the business plan in the CMP

9. The business plan included in the CMP must identify:
   - i all proposed coastal management actions identified elsewhere in the CMP;
   - ii the full proposed capital, operational and maintenance costs, and recommended timing, of proposed coastal management actions;
   - iii any proposed cost-sharing arrangements and any other viable funding mechanisms for the proposed coastal management actions to ensure delivery of those actions is consistent with the timing for their implementation under the CMP; and
   - iv the distribution of costs and benefits of all proposed coastal management actions.

Requirements for preparing a CMP which includes a proposed or mapped coastal vulnerability area

10. Where coastal hazards have been identified in a coastal management area, a CMP must identify proposed coastal management actions for those hazards.
11. If the CM Act requires that a coastal zone emergency action subplan be prepared, it must identify any requirements for how emergency coastal protection works, within the meaning of the CM SEPP, are to be carried out.

Note: Clause 19(4) of the CM SEPP defines emergency coastal protection works to mean '*works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land*'.

Requirements for taking coastal change into account when preparing a CMP

12. A CMP must demonstrate how a council has considered:
    i projected population growth and demographic changes; and
    ii projected use of coastal land for infrastructure, housing, commercial, recreational and conservation purposes.

13. A CMP must demonstrate how a council has considered:
    i current and future risks, at timeframes of immediate, 20 years, 50 years, 100 years and (if council considers it relevant based on expert advice) beyond;
    ii (if council considers it relevant) current and future risks of potentially high consequence, low probability events that may affect the relevant area;
    iii the effects of projected climate change and how it may affect the relevant area;
    iv the local and regional scale effects of coastal processes; and
    v the ambulatory and dynamic nature of the shoreline and how it may affect the relevant area.

Format and content required for a CMP

14. A CMP is to include the following sections:
    i Executive summary
    ii Introduction
    iii A snapshot of issues
    iv Actions to be implemented by the council or by public authorities
    v Whether the CMP identifies recommended changes to the relevant planning controls, including any proposed maps
    vi A business plan
    vii Coastal zone emergency action subplan, if the CM Act requires that subplan to be prepared
    viii Monitoring, evaluation and reporting program
    ix Maps
    x Reference list

Consultation on the coastal management program

Statutory provisions

16 Consultation

(1) Before adopting a coastal management program, a local council must consult on the draft program with:

(a) the community, and

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

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

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

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

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

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

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

(2) Consultation under this section is to be undertaken in accordance with the relevant provisions of the coastal management manual.

(3) A failure to comply with this section does not invalidate a coastal management program.

(4) The regulations may amend Schedule 1.

Mandatory requirements

Community engagement and consultation

15. A draft CMP must be exhibited for public inspection at the main offices of the councils of all local government areas within the area to which the CMP applies, during the ordinary hours of those offices, for a period of not less than 28 calendar days before it is adopted. This mandatory requirement does not prevent community consultation, or other consultation, in other ways.

Adoption, certification and gazettal of a coastal management program

Statutory provisions

17 Adoption, certification and gazettal of coastal management program

(1) A local council may adopt a draft coastal management program and submit it to the Minister for certification under this section.

(2) The Minister may certify, or refuse to certify, that the draft coastal management program submitted to the Minister has been prepared in accordance with the requirements of this Part and the coastal management manual.

(3) The local council, after the coastal management program has been certified by the Minister, must publish it in the Gazette.

(4) A coastal management program takes effect on the date on which it is published in the Gazette or, if a later date is specified in the program for its commencement, on the later date so specified.

Review, amendment and replacement of a coastal management program

Statutory provisions

18 Review, amendment and replacement of coastal management programs

(1) A local council is to ensure that its coastal management program is reviewed at least once every 10 years. The review is to be undertaken in accordance with the coastal management manual.

(2) A coastal management program may, at any time, be amended (in whole or in part) by another coastal management program.

(3) A coastal management program may, at any time, be replaced by another coastal management program.

(4) Following a review, a local council may, by notice published in the Gazette, repeal a coastal management program.

Mandatory requirements

Monitoring and reporting on implementation of a CMP

16. When implementing a CMP, a council must:
    - i carry out the monitoring, evaluation and reporting program in the CMP (MER); and
    - ii monitor key indicators, trigger points and thresholds identified in the MER.

Note: It is intended that the information obtained from the MER will be used during the review of a CMP under section 18 of the CM Act or in connection with any amendment to, or replacement of, the coastal management program.

17. Councils must report on the implementation of a CMP through the IP&R framework on an annual, four yearly and ten-yearly basis.

Inspection of a coastal management program

Statutory provisions

19 Availability of coastal management programs

(1) A copy of a coastal management program must be available for inspection by the public without charge at the office of the local council during ordinary office hours.

(2) A copy of a coastal management program must be available for public inspection on the website of the local council within 7 days of its publication in the Gazette.

Implementation of a coastal management program

Statutory provisions

22 Implementation of coastal management program by local councils

(1) A local council is to give effect to its coastal management program and, in doing so, is to have regard to the objects of this Act.

(2) In particular, without limiting subsection (1), a local council is to give effect to its coastal management program in:

(a) the preparation, development and review of, and the contents of, the plans, strategies, programs and reports to which Part 2 of Chapter 13 of the Local Government Act 1993 applies, and

(b) the preparation of planning proposals and development control plans under the Environmental Planning and Assessment Act 1979.

Mandatory requirement

18. When an adjoining council or a public authority is affected, or is likely to be affected, by implementation of some aspect of a CMP, a council must liaise with that authority when implementing that aspect of the CMP.

23 Other public authorities to have regard to coastal management program and coastal management manual

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

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

26 Performance audit of implementation of coastal management programs

(1) The NSW Coastal Council, at the request of the Minister, is to conduct a performance audit of the implementation of a coastal management program of a local council.

(2) The purpose of the performance audit is:

(a) to determine whether a local council is effectively implementing its coastal management program, and

(b) to identify opportunities for local council capacity building.

(3) The NSW Coastal Council may, by notice in writing given to a local council, require the local council to provide it with such information or records (or both) as the notice requires in connection with a performance audit.

(4) A local council is to comply with a notice given under this section.

(5) The NSW Coastal Council is, at the conclusion of the performance audit, to provide the Minister with a report.

(6) If the NSW Coastal Council is of the opinion that the local council is not complying with its coastal management program to a significant extent, the NSW Coastal Council may make recommendations to the Minister on appropriate remedial actions to be taken, including that the Minister refer the matter to the Minister administering the Local Government Act 1993 for further consideration.

(7) The Minister, within 3 months of the end of each calendar year, is to cause the reports provided to the Minister under this section during that year (if any) to be tabled in each House of Parliament.

(8) The regulations may make provision for or with respect to performance audits under this section.

Mandatory requirements

Information to support a performance audit

19. Councils must maintain sufficient information and records about its management of the relevant parts of the coastal zone that will enable it to demonstrate:
    i how the CMP has been implemented
    ii what has been achieved in connection with the CMP, including whether coastal management actions have been carried out within the timeframes identified in the CMP.


Our future on the coast
NSW Coastal Management Manual Part B:
Stage 1 – Identify the scope of a coastal
management program
NSW
GOVERNMENT

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Identify the scope of a coastal management program

The scoping study is the first stage in the process of preparing a coastal management program.

The scoping study assists council to:

- identify the community and stakeholders and prepare an engagement strategy
- determine the strategic context of coastal management
- establish the purpose, vision and objectives
- determine the key coastal management issues and the spatial extent of management areas
- review current coastal management arrangements
- establish roles, responsibilities and governance
- determine where action is required through a first-pass risk assessment
- identify knowledge gaps and information needs
- prepare a preliminary business case
- determine whether a planning proposal will be prepared to amend coastal management area maps and the Local Environmental Plan
- develop a forward program for subsequent stages of the coastal management program, including a fast-tracking pathway.

1.1 Purpose and overview of Stage 1 – scoping study

The following sections of the *Coastal Management Act 2016* and associated mandatory requirements in Part A are most relevant to this stage

Section 12 Purpose of coastal management programs.

Section 13 Requirement for coastal management programs.

Section 14 Preparation of coastal management programs.

Section 15 Matters to be dealt with in coastal management program.

Section 16 Consultation.

Section 18 Review, amendment and replacement of coastal management programs.

The *Coastal Management Act 2016* (CM Act) provides for the integrated management of the coastal environment of New South Wales consistent with the principles of ecologically sustainable development, for the social, cultural and economic wellbeing of the people of the State.

The CM Act sets out the strategic vision for managing our future coastal landscape. It sets overarching objects for the coast of New South Wales and management objectives for four different management areas that comprise the coastal zone.

Coastal management programs (CMPs) set the long-term strategy for the coordinated management of the coastal zone. Councils are to ensure that their CMP is to be reviewed at least once every 10 years. A CMP may be amended (in whole or in part) or replaced by another CMP at any time. It is recommended that councils complete Stage 1 (scoping study) for new and updated CMPs, regardless of whether a council already has a CMP, coastal zone management plan (CZMP) or other management plans, policies and practices.

The primary purposes of Stage 1 (scoping study) are to:

- review progress made in managing issues in coastal areas
- develop a shared understanding of the current situation
- identify the focus of the new CMP.

Stage 1 builds on and integrates with previous work, including existing plans and strategies, technical studies and stakeholder input. Where a council has been implementing an existing CMP or CZMP, Stage 1 continues the planning cycle following the evaluation and review of previous plans or programs.

In situations where no CMP or CZMP exists, councils may use Stage 1 to determine whether any existing management arrangements, such as plans of management for foreshore reserves, adequately identify coastal issues and manage them in a way that meets the requirements of the CM Act and the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP).

1.1.1 Stage 1 process overview

Stage 1 sets up a collaborative, risk-based and outcome focused process using best available information. It guides council in formulating appropriate strategies and actions in later stages of the planning process.

Stage 1 is designed to assist councils to:

- review the strategic context for coastal management in the local area
- determine the purpose of the CMP and the key outcomes that it is intended to deliver
- identify the appropriate scope for the CMP, consider the area and range of issues to be dealt with and identify which organisations or communities need to be involved
- determine the adequacy of available information and management actions and identify subsequent stages in the preparation of a CMP, including the possibility of fast-tracking (see **Figure B1.1**).

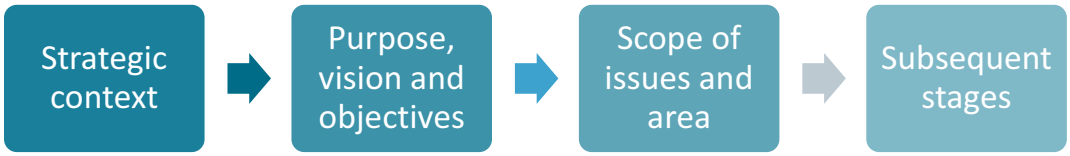

Figure B1.1 Steps in determining the context, purpose and scope of a CMP

During Stage 1 councils may draw on information such as management reports, mapping, monitoring, survey responses, population and economic statistics, and completed studies. This stage does not involve new studies; if new studies are necessary, they will be part of Stage 2.

The information gathered may be used to:

- engage with the local community and key stakeholders including relevant public authorities (**Section 1.2.1**)
- determine the strategic context for coastal management, including the interdependence of the environmental, social and economic characteristics of the coast (**Section 1.3**)
- confirm the purpose of the CMP and council's vision and objectives for the coastal zone including all four coastal management areas (**Section 1.4**)
- identify the scope of the CMP including:
  - key management issues, trends and risks affecting the area now and for scenarios that are likely in the foreseeable future, including demographic projections, potential impacts of climate change and socioeconomic changes (**Section 1.5.1**)
  - which coastal management areas will be included in the CMP (**Section 1.5.2**)
  - whether a planning proposal will be prepared to amend council's Local Environmental Plan (LEP) to include updated boundaries for any coastal management area (**Section 1.5.2**)
- review current coastal management arrangements (**Section 1.6**)
- review existing mapping of coastal management areas and land affected by coastal hazards and identify areas where further refinement may be required to redefine and map coastal management areas (**Sections 1.6.1**, **1.6.2**, **1.6.3** and **1.6.4**)
- establish roles, responsibilities and governance arrangements (**Section 1.7**)

- determine where additional action may be required and opportunities for improvement (**Section 1.8**)
- identify knowledge gaps and information needed to inform decisions (**Section 1.8.1**)
- undertake a first-pass risk assessment to establish what is known about impacts of coastal hazards and vulnerabilities of coastal values and assets (**Section 1.8.2**)
- assess the community's attitude to risk in terms of acceptable, tolerable and unacceptable risk (**Section 1.8.2**)
- develop a preliminary business case for preparing the CMP (**Section 1.9**)
- present the findings in a clear report, that explains the proposed way forward (**Section 1.10**)
- prepare a forward program for subsequent stages in the preparation of a CMP, including 'fast-tracking' (**Section 1.11**), and
- consult with Office of Environment and Heritage (OEH) and (through the Minister) the NSW Coastal Council about the proposed scope of the CMP, to confirm that proposed steps in the preparation of the CMP are consistent with the requirements of the CM Act, CM SEPP and manual (**Section 1.12**).

1.2 Getting started

The effectiveness of a CMP largely depends on the quality of the information used to inform the planning process and the extent to which stakeholders and decision-makers are actively engaged. Matters to consider may include:

- Is this a new CMP or a review or amendment of a CZMP or CMP?
- Is the CMP review in response to specific Ministerial Directions or a performance audit report from the NSW Coastal Council?
- Are there specific timeframes for the preparation of the CMP?
- Are there other engagement processes that should be aligned with the preparation of the CMP?

The preparation of a CMP will be enhanced if, at the outset, there is a broad level of awareness across council officers, councillors and stakeholders about the purpose of a CMP. This includes an understanding of what is involved in preparing and implementing a CMP within the context of council's other roles and responsibilities. Effective early preparation activities will help reduce unintended consequences and miscommunication.

Preliminary work should aim to establish:

- A clear understanding within council and its communities of the coastal management framework.
- Strong relationships with the community.
- Clear lines of communication.
- An understanding of roles, responsibilities and governance processes.
- The level of engagement and collaboration with public authorities to facilitate the preparation, certification and implementation of the CMP.
- A collaborative approach with neighbouring councils. Consultation with other local councils on the draft CMP is required by s16 (1) (b) (i) and (ii) of the CM Act where those councils share a coastal sediment compartment or estuary as specified in Schedule 1 of the CM Act.

When scoping a new or updating an existing CMP, council may consider:

- how a CMP can inform land use planning controls and operational priorities and budgets
- the links between the CMP and council's strategic and operational planning processes
- councillors' awareness of any emerging coastal management issues
- the potential risks in the CMP planning process, for instance in relation to timing, misunderstanding or conflicting perspectives and aspirations
- how much time should be set aside to prepare a CMP to ensure that the process will align with Integrated Planning and Reporting (IP&R) timeframes
- the resources required, in terms of staff and budget, for obtaining relevant detailed information for community engagement, communication and delivery
- whether there are specific implementation processes and mapping aspects that need to be revisited
- whether changes to the boundaries of the coastal zone or any one of the coastal management areas are likely to be required
- how the preparation of the CMP will be aligned with the preparation of a Planning Proposal to amend the Local Environmental Plan (LEP) and subsequently the CM SEPP
- how their CMP relates to the management of the marine estate
- how adjoining councils and public authorities will be involved in preparing and implementing the CMP to achieve an integrated approach to managing the coast
- the key messages for the community about council's approach to coastal management.

1.2.1 Engage with stakeholders and the community

Effective engagement and communication are important aspects of a successful CMP. It is recommended that councils engage with stakeholders from the outset and during various stage of the process.

Prior to or during Stage 1, councils will find it useful to raise stakeholders' awareness of the requirements of the CM Act and the CM SEPP. It is of value that stakeholders are aware of the links with other legislation such as the *Environmental Planning and Assessment Act 1979* (EP&A Act), *Marine Estate Management Act 2014* (MEM Act), *Biodiversity Conservation Act 2016*, *Crown Lands Act 1989* and *Crown Lands Management Act 2016* and the *Local Government Act 1993*.

Engaged communities and stakeholders can facilitate the preparation of a representative CMP and enable the planning process to remain flexible and responsive to changing values. Through active engagement, a shared understanding of the risks and uncertainties can be established. Community and stakeholder support for the actions included in a CMP will be beneficial during the implementation phase.

At this early stage, it is recommended that councils develop a community and stakeholder engagement strategy. Such as strategy outlines:

- which individuals and organisations should be involved in the review, preparation and implementation of the CMP
- how and when they will be offered engagement opportunities
- how their input will be incorporated into the planning process.

For the Stage 1 scoping study, relevant information about the community and its interests and aspirations for the coast may be drawn from results of previous community engagement or surveys.

Considerations in preparing an engagement strategy include:

- the time elapsed since any previous coastal planning process
- changes to the demographic structure of the community including length of residence, and future projections of population growth
- the complexity of coastal management issues and the level of risk
- which individuals, organisations and public authorities are relevant and their relative interest and influence in CMP outcomes
- specific consultation required to align with the preparation of a planning proposal
- the community's values, aspirations, perceptions and attitudes to the coast
- the level of community satisfaction with council's previous consultation and coastal management performance
- diverse community preferences as to how and when they are engaged in the planning processes
- how to design an equitable, inclusive and legitimate process
- specific consultation requirements that may apply, for example, when management issues involve the Aboriginal community.

Studies to collect and analyse more detailed information about the community and stakeholders may be included in Stage 2.

1.3 Determine the strategic context of the CMP

To understand and address coastal management issues in a risk framework, councils need to have a clear understanding of the internal and external context in which they are operating. This includes:

- the strategic direction established for the coast in regional or local planning documents
- environmental context, including physical features and processes such as coastal sediment compartment, habitat extent and health, catchment characteristics and climate change
- political and governance context and the relationships between the council, adjoining councils and other public authorities
- legal context such as relevant legislation and policies, land tenure and land managed as national park or Crown reserve
- social context such as population growth and seasonal demographic changes
- cultural context, including the cultural background of residents and other stakeholders and the presence of places of historical or cultural significance such as Aboriginal sites
- economic context such as equity, distribution of wealth, willingness to pay and the reliance of the community on coastal related tourism or other coast-dependent businesses such as aquaculture

- technical context such as the understanding of coastal processes and climate change or the need to review and amend the mapping of the coastal management areas
- the significance and sensitivity of coastal values and issues in the local council area
- the nature and extent of existing development and proposed future development scenarios and infrastructure (regional growth plans)
- the vulnerability of coastal assets, infrastructure and communities
- the community's attitude to risk including what level of risk is considered acceptable, tolerable and unacceptable
- whether there are any barriers within council or its community that may constrain or add complexity to the CMP planning process
- the existence of a previous CMP (or CZMP) and any key learnings, significant coastal hazard events, emerging or changed threats that have arisen during its implementation which may affect strategic priorities.

1.4 Establish the purpose, vision and objectives

The CM Act sets out the statewide objects and objectives for managing the NSW coast by councils and public authorities.

A local vision statement that is consistent with the state's vision while reflecting the local context will help communities to identify with the future of their coast, encourage a sense of community ownership of the actions in the CMP and foster commitment to its preparation and implementation.

Local objectives developed during Stage 1 may be stated in broad terms, to establish council's overall strategic direction, and undergo further refinement at later stages of the planning process.

In identifying coastal management objectives for their area, councils may consider:

- specific local and regional-scale coastal objectives (from the Community Strategic Plan or other strategic plans), that reflect community values and any special characteristics of the local area
- how progress towards achieving the objectives will be measured, such as relevant indicators.

1.5 Identify the scope of the CMP, including key management issues and areas

1.5.1 Identify key management issues

During Stage 1, background information to determine key coastal management issues will be reviewed. The regional priority risks identified through the Threat and Risk Assessment (TARA) for the Marine Estate and associated background reports will be a useful resource.

Councils should consider planning timeframes and pathways from now, to 20, 50, 100 years and beyond, where appropriate. Councils may also consider the vulnerabilities and risks associated with a range of future scenarios, likelihoods and consequences including rare or potentially catastrophic events.

The coastal issues may be associated with:

- threats to natural coastal processes and environmental values
- threats to social and cultural values including public access, amenity values, usage and safety
- threats to Aboriginal peoples' spiritual, social, customary and economic use of the coast
- existing impacts on cultural heritage values, both Aboriginal and historical
- threats to sustainable coastal economies
- future economic development and changing drivers of economic activity in coastal towns (for instance, tourism rather than primary production)
- conflicts associated with land use and access to coastal resources
- current and future risks from coastal hazards including climate change
- potential impacts of climate change on a broad range of built and natural assets and values including coastal ecological communities, water quality and river flows, cultural values and recreational opportunities
- the evolving, ambulatory and dynamic nature of coastal landforms and habitats
- lack of integrated and coordinated policies, planning and management
- the vulnerability or resilience of coastal assets and infrastructure including the need to upgrade public facilities
- the need to amend the council's Local Environmental Plan (LEP) or Development Control Plan (DCP)
- increasing demand for residential land and land suitable for coast-dependent businesses
- social changes including changes to popular recreational activities and the role of volunteers
- barriers to public participation in decision-making
- the acquisition of land by public or local authorities.

When undertaking a scoping study, councils may consider a range of future scenarios for their coastal zone that are plausible and scientifically credible, including worst case, mid-range and best-case scenarios. This may include a range of development and demographic scenarios, physical changes to the coast, future sea level and extreme water level values and projected impacts of climate change.

These scenarios may assist decision-makers to understand sensitivity to change when managing their risks. Decision-makers may use these scenarios for relative vulnerability or risk assessments across the council area.

More detailed discussion of potential management issues for the four coastal management areas is included in **Sections 1.6.1** to **1.6.4**.

1.5.2 Identify and map the spatial extent of coastal management areas

The coastal zone is made up of a combination of four coastal management areas (as defined in the CM Act and CM SEPP). The area covered by a CMP may include all or any part of the coastal zone within the council area, but may also extend outside the council boundaries, and be prepared in cooperation with adjoining councils.

The CMP may also cover areas outside the mapped coastal zone, where the management of the external area has a significant impact on issues within the coastal zone, for instance,

wider estuarine catchments. This helps to ensure that actions are integrated and undertaken at an appropriate scale to address the issues.

The CM SEPP maps of the coastal zone provide a starting point and can be modified by planning proposals or by the NSW Government as further information becomes available. Local studies and modelling undertaken by or on behalf of councils when preparing their CMP will assist in better defining the coastal management areas. The community and government will have the opportunity to be involved in any proposed changes to the mapped areas through the preparation of a planning proposal under the EP&A Act, in parallel with the preparation of the CMP.

In the CM SEPP, the coastal wetlands and littoral rainforests area are based on state-level mapping of lands that display the hydrological and floristic character of coastal wetlands, littoral rainforests and adjoining features.

The maps reflect an improved knowledge of coastal wetlands and littoral rainforests and include information from recent studies undertaken by public authorities, local councils and academic institutions. However, additional local scale mapping undertaken by or on behalf of councils will be able to improve mapping over time.

The sensitivity, adaptive capacity and tolerance of the community to coastal hazards may be considerations in mapping of the proposed coastal vulnerability area for land use planning purposes in the local council area.

Some councils have mapped areas affected by some coastal hazards in LEPs and DCPs, based on previous coastal hazard studies. Local coastal hazard modelling and mapping may be used to inform the mapping of the coastal vulnerability area for all coastal hazards.

Where areas affected by coastal hazards have not been previously defined at the local level (e.g. by or on behalf of a council) broader mapping may be applied during the scoping study. Further studies to ensure the impacts of coastal hazards are fully considered may be developed in Stage 2.

The NSW Government will work with councils and communities to ensure that coastal hazards are further considered, and where appropriate, reflected in CMPs and land use planning instruments.

The coastal environment area and coastal use area, as mapped in the CM SEPP, are based on defined distances around coastal water bodies and the open coast. Local studies undertaken by council may provide the evidence to amend these areas based on local information.

Under the section 9.1 direction for coastal management, councils may prepare a planning proposal to amend the maps in their LEP to increase or decrease the area mapped in any of the four coastal management areas in their local area.

Councils are advised to be aware of the potential overlap of the coastal management areas and the interdependence and spatial extent of the coastal management issues where these cross-council boundaries.

In Stage 1, a council may identify:

- Which of the four coastal management areas were covered in their previous CZMP or CMP and what issues were regarded as significant?
- Which of the four coastal management areas (all or in part) are applicable to the issues that will be the focus of the new or updated CMP?
- Whether the boundaries of the management areas are appropriate to address the management issues. Councils will highlight locations where amendments to the mapped coastal management areas are likely to be proposed.

- Where coastal management areas overlap and the hierarchy of management objectives applies.

1.6 Review the current coastal management arrangements

The NSW Government recognises that many coastal councils have prepared CZMPs and worked with public authorities and their community to implement actions. The intent is that councils and public authorities will continue to build on what has already been achieved, but recognises that some CZMPs relate to specific issues or parts of the coastal zone.

During Stage 1 councils may review management issues and challenges and the effectiveness of existing management arrangements. This review helps identify the strengths and weaknesses of past and present responses, any previous barriers to implementation, and potential opportunities to respond and adapt to future challenges.

Matters which may be considered in the management review are summarised in **Figure B1.2**.

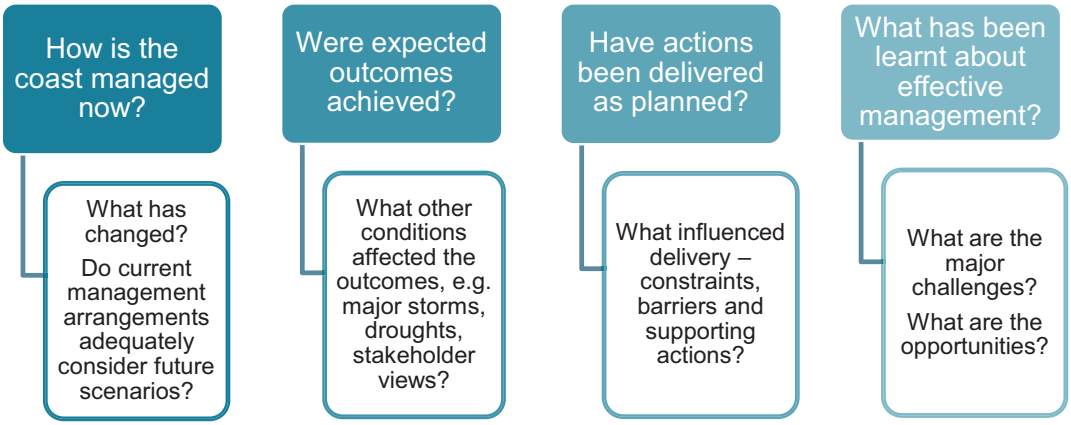

Figure B1.2 Reviewing current management arrangements

When reviewing the performance of existing management responses and land use planning instruments, a council may consider whether:

- actions proposed were implemented as intended and any lessons learned about practicality and effectiveness
- the implemented actions have achieved intended objectives and outcomes (including the resilience of outcomes achieved) and the relative costs and benefits involved
- management actions that have been implemented are consistent with the requirements of the CM Act and CM SEPP
- the vulnerability of existing coastal assets and infrastructure is compatible with the level of exposure to current and future risk from coastal hazards
- council and stakeholder responses to coastal hazard events and emergencies have been coordinated and appropriate
- the current mapping of coastal management areas encompasses the spatial extent of management issues, natural features, habitats and coastal hazards as population continues to grow and development pressures increase

- trends in water quality, aquatic productivity, habitats, beach and foreshore accessibility and usage pose a threat to coastal values
- there are likely changes in the distribution, frequency or intensity of coastal hazards or threats to coastal values
- any previously identified monitoring triggers or thresholds have been reached
- the level of community understanding and involvement in coastal management is changing
- community satisfaction with the direction and outcomes of current management is changing.

Sections 1.6.1 to **1.6.4** provide further information about the issues that councils may consider when reviewing the effectiveness of current management responses for any of the four coastal management areas.

Much of the information needed to assess current management responses may be available from the monitoring, review and reporting programs that are linked to the council's Community Strategic Plan, Delivery Program, annual reports and State of the Environment reporting. Information may also be available from mapping and reports or reviews prepared by public authorities and other organisations.

Where councils have already integrated coastal management within their IP&R framework, they will have the results of four-yearly progress and performance reviews. This information can be used to evaluate what has been achieved and what has been learned since their previous CMP (or CZMP) was prepared. For instance, community satisfaction surveys conducted for the preparation of the Community Strategic Plan may provide feedback on the effectiveness of coastal management.

The review may also consider management in adjoining local government areas, where councils share a sediment compartment or estuary as specified in Schedule 1 of the CM Act.

1.6.1 Coastal wetlands and littoral rainforests

Section 6(2) of the CM Act states –

The management objectives for the coastal wetlands and littoral rainforests area are as follows:

a. *to protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity,*

b. *to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests,*

c. *to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration,*

d. *to support the social and cultural values of coastal wetlands and littoral rainforests,*

e. *to promote the objectives of State policies and programs for wetlands or littoral rainforest management.*

Coastal wetland and littoral rainforest communities have high biodiversity values and are of regional and state significance. These communities are very sensitive to certain types of development and environmental threats.

In Stage 1, a council may compile existing information to describe how management is currently undertaken for the coastal wetlands and littoral rainforests area. The scoping study may identify any significant impacts through the first-pass risk assessment (Section 1.8.2) to determine whether coastal wetlands and littoral rainforest management areas may benefit from:

- a change of management approach to provide an appropriate level of protection and resilience
- more information to improve management decisions or reduce uncertainty.

This could involve working collaboratively to:

- identify management objectives and outcomes for coastal wetland and littoral rainforest areas
- review the maps of coastal wetland and littoral rainforest areas and compare them with existing local studies and mapping for the local area
- identify whether a planning proposal will be prepared in relation to the mapping of the wetland and littoral rainforest area
- establish a baseline and review information about the trends in the condition of the coastal wetland and littoral rainforest area, using the most up-to-date information that is available
- identify any gaps in knowledge about the functions and responses to threats and to management actions in coastal wetlands and littoral rainforests
- identify current and future threats to the resilience and functions of coastal wetlands and littoral rainforests areas (and relevant proximity areas), over planning horizons of at least 50 years
- review how coastal wetland and littoral rainforest areas are currently managed and evidence about the success of current management approaches in reducing vulnerability and threats

- identify potential vulnerabilities of the existing ecosystems, and opportunities to improve their resilience and adapt to the impacts of climate change over planning horizons of at least 50 years
- identify opportunities to enhance outcomes for wetlands to achieve the relevant coastal management objectives.

Potential management issues and threats to coastal wetland and littoral rainforest areas include, but are not limited to:

- acidic or low dissolved oxygen events
- changes to salinity and/or the salinity regime of surface and groundwater
- changing hydrology – through groundwater or drainage modification
- contraction of saltmarsh areas and ability for migration of wetland communities
- entrance management activities
- foreshore erosion, reclamation (including filling and foreshore structures) or dredging
- inappropriate fire regimes
- inappropriate plant or firewood collection
- increased frequency of inundation, or persistent inundation, due to sea level rise or changes to hydrology
- invasive plant and animal species and pathogens
- mowing, clearing and fragmentation
- sediment runoff and/or water discharge
- shipping and boating activities
- stock grazing
- structures such as levees, seawalls and floodgates that constrain the area and movement of wetland communities
- tracks and trails used by pedestrians, bicycles and off-road vehicles
- urban expansion and edge effects
- waste dumping.

1.6.2 Coastal vulnerability areas

Section 7(2) of the CM Act states –

The management objectives for the coastal vulnerability area are as follows:

a. *to ensure public safety and prevent risks to human life,*

b. *to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change,*

c. *to maintain the presence of beaches, dunes and the natural features of foreshores, considering the beach system operating at the relevant place,*

d. *to maintain public access, amenity and use of beaches and foreshores,*

e. *to encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions,*

f. *to adopt coastal management strategies that reduce exposure to coastal hazards:*

   i. *in the first instance and wherever possible, by restoring or enhancing natural defences including coastal dunes, vegetation and wetlands, and*

   ii. *if that is not sufficient, by taking other action to reduce exposure to those coastal hazards,*

g. *if taking other action to reduce exposure to coastal hazards:*

   i. *to avoid significant degradation of biological diversity and ecosystem integrity,*

   ii. *to avoid significant degradation of or disruption to ecological, biophysical, geological and geomorphological coastal processes,*

   iii. *to avoid significant degradation of or disruption to beach and coastal foreshore amenity and social and cultural values,*

   iv. *to avoid adverse impacts on adjoining land, resources or assets,*

   v. *to provide for the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by actions to reduce exposure to coastal hazards,*

h. *to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency,*

i. *to improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.*

Coastal hazards are defined in s 4 (1) of the CM 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
g) erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

In Stage 1, compiling information on coastal hazards may assist council to:

- Identify management objectives and outcomes for areas subject to coastal hazards.
- Review current information about coastal geomorphology, including landform types and histories, features and processes that are relevant to the council area.
- Identify relevant coastal sediment compartments, sediment budgets and pathways and related factors in the geomorphic evolution and dynamics of the coast.
- Determine whether more than one council area is located within coastal sediment compartments (Schedule 1 of the CM Act) and the catchments of sensitive coastal lakes (Schedule 1 of the CM SEPP). **Figure B1.3** illustrates sediment compartments.
- Identify relevant coastal processes acting singularly or in combination, which affect coastal hazards, including:
    - coastal processes, such as tides, waves, currents, winds and storm patterns, including factors such as tidal anomalies, coastally trapped waves, wave runup and extreme ocean level events
    - the interaction between coastal, geologic and geomorphic processes for areas subject to coastal cliff and slope instability
    - catchment characteristics and flows and the potential for river floods to coincide with extreme oceanic events
    - the interaction of coastal and catchment processes in estuaries and coastal lakes
    - the predicted and foreseeable impacts of climate change.
- Identify and review any existing coastal hazard, risk and vulnerability studies for the local area. Assess adequacy of methods and potential to inform decision-making.
- Identify the information required to map the coastal vulnerability area and prepare a planning proposal.
- Identify any gaps in knowledge about areas exposed to current and future risk from coastal hazards or coastal vulnerability areas.
- Review the effectiveness of existing management actions and emergency responses to mitigate current, future and residual risk from coastal hazards.
- Identify areas potentially exposed to current and future risk from coastal hazards for a range of probabilities and timeframes for the purposes of risk assessment in Stages 2 and 3 and to help determine and map the coastal vulnerability area for the purposes of land use planning in Stage 4.
- Identify risk to life and public safety from identified coastal hazards. These may include:
    - coastal cliff and slope instability (e.g. catastrophic failure of cliffs and headlands and hazards associated with rock platforms)
    - beach erosion, where materials which have been placed on the beach in protection works become dislodged onto the beach and into the surf zone
    - coastal inundation due to extreme storm events or other events such as tsunamis
    - inappropriate access to or recreational use of coastal waterways, entrances or shore platforms where coastal processes are severe, intermittent or unpredictable.
- Ascertain community awareness about the likelihood and consequences of coastal hazards, vulnerability and risk to life and public safety, potential management actions, emergency preparedness and responses, and roles and responsibilities.
- Identify opportunities to reduce exposure to risk from coastal hazards to achieve the coastal management objectives; for instance, this could include activities to mitigate the risk from coastal hazards, preserve beaches, maintain public access and amenity, restore or enhance natural defences and avoid degradation if undertaking mitigation works.

Appropriate coastal hazard and risk studies enable good land use planning. The direction by the Minister for Planning under section 9.1 of the *Environmental Planning and Assessment Act 1979* for coastal management requires that a council must not prepare a planning proposal to rezone land which would enable increased development or more intensive use on land:

- in a coastal vulnerability area identified in the CM SEPP
- identified as affected by a current or future coastal hazard in a study, assessment or plan undertaken by or on behalf of a public authority or the relevant planning authority.
- within a coastal wetlands and littoral rainforests area identified in the CM SEPP

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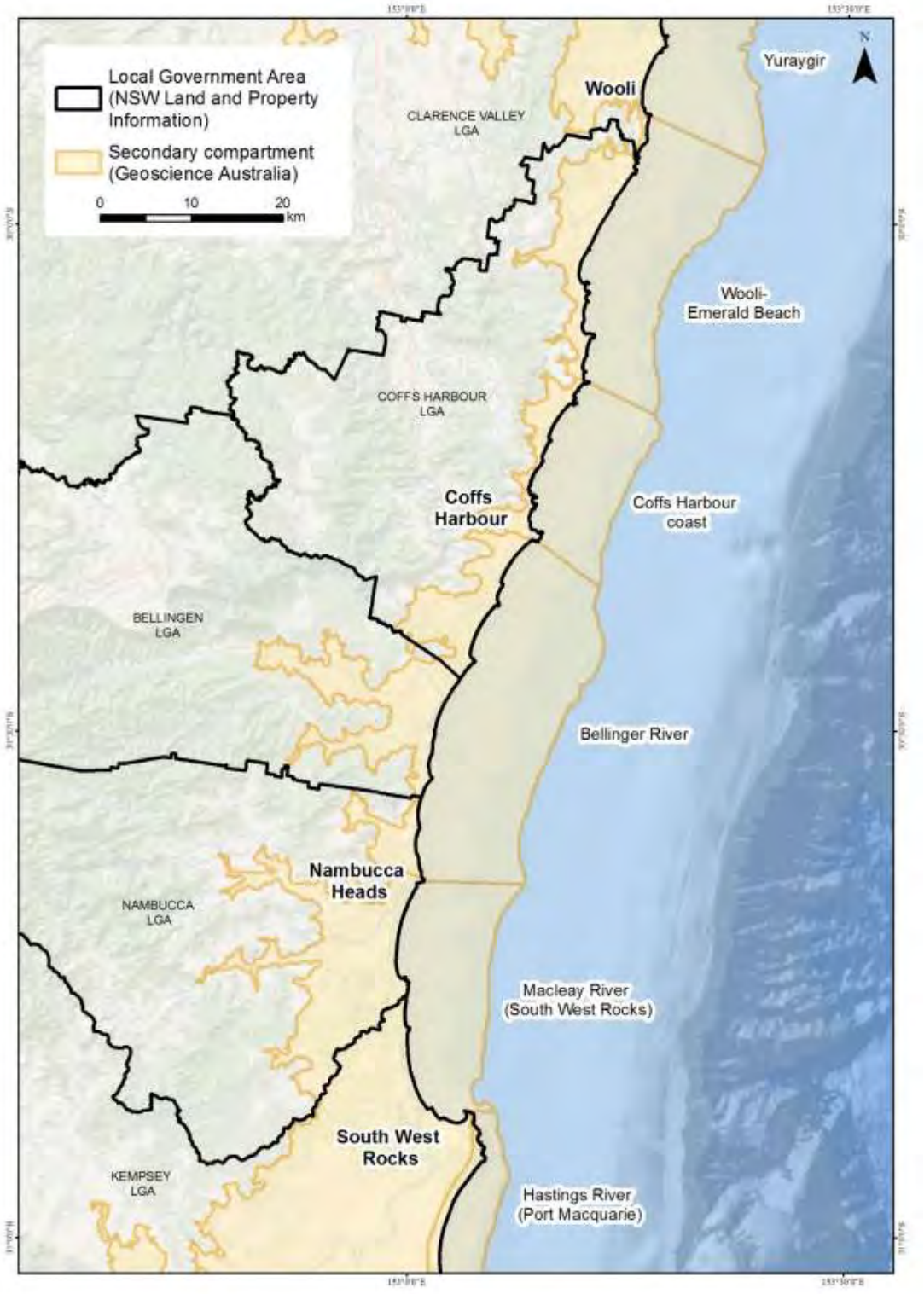

Figure B1.3 Coastal sediment compartments and local government area boundaries

Available coastal process and hazard mapping resources

Coastal hazard information may assist risk assessment and in defining the extent of the coastal vulnerability area for land use planning purposes.

Coastal sediment compartments are referred to in Part 1 of Schedule 1 to the CM Act. Mapping of coastal secondary sediment compartments has been prepared. Councils may also refer to mapping of tertiary sediment compartments where appropriate (refer to Figure B1.3 for an example of a section of the NSW coast showing sediment compartments).

Councils may also be able to draw on statewide information including maps that are based on empirical data and modelling, with clearly stated assumptions. National or statewide coastal hazard mapping may be suitable for a first-pass risk assessment. It may not be suitable for use in further stages when a first-pass risk assessment indicates that risks are greater than 'low' and 'acceptable' (refer to **Section 1.8.2** for further information).

Many councils have previously commissioned detailed coastal hazard assessments for beaches, headlands and/or estuaries when preparing CZMPs. These studies generally provide higher resolution assessment of local areas than national or statewide mapping.

Councils may review the information and the methodology of existing coastal hazard assessments to determine whether they continue to be fit-for-purpose.

Reports from the community and historical records (including photos) may provide longer-term context about the dynamic nature of impacts of coastal erosion and inundation.

Public assets and infrastructure

Councils may use available information when considering coastal hazard risk associated with public infrastructure and/or assets to determine if additional studies are necessary. This may include consideration of the anticipated timing of impact relative to the infrastructure or asset life. This may involve consultation with other public authorities.

The effectiveness and asset life of any existing protection structures or other measures may be a consideration.

Infrastructure assets which may be considered include, but are not limited to:

- beach access ways and lookout structures, including fencing
- boat ramps and wharves
- bridges and walkways
- gas infrastructure
- parkland including council community land, national parks and Crown reserves
- ports and harbours
- power transmission lines and power stations
- roads and rail lines
- seawalls, breakwaters and revetments
- sewage systems and pump stations
- stormwater management systems
- telecommunications infrastructure
- water supply infrastructure systems, pipelines, plants and fire hydrants.

Private assets and uses

In considering risk to private residences and commercial buildings, councils may draw on an existing coastal hazard study or other information. This may include, reports from the community, historical records, photographs or video footage. This local information may assist council to identify areas exposed to coastal hazards, refine the coastal vulnerability area and determine whether further detailed studies are necessary.

Some localities with private assets in areas exposed to coastal hazards are currently afforded a level of protection by a variety of coastal structures (including geotextile bags, rock and rubble walls, sheet piling, concrete walls and tyres). The scoping study may consider the location, legality, liability, structural integrity, sustainability, ongoing maintenance arrangements and effectiveness of these existing structures.

Public use and value

When considering the significance of coastal hazard impacts and the performance of any hazard mitigation (including protection structures), councils may consider the impact of the hazard or management action on continuing safe public access, use and enjoyment of the coast.

1.6.3 Coastal environment areas

Section 8(2) of the CM Act states –

The management objectives for the coastal environment area are as follows

a. *to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity,*

b. *to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change,*

c. *to maintain and improve water quality and estuary health,*

d. *to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons,*

e. *to maintain the presence of beaches, dunes and the natural features of foreshores, considering the beach system operating at the relevant place,*

f. *to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.*

A CMP prepared for a coastal environment area may address significant threats to the condition of the coastal environment area (or where updating a CMP, changes to those threats since the current plan was prepared).

When scoping the CMP, council is advised to consider whether threats to coastal environment areas are being managed by existing mechanisms (set out in the Community Strategic Plan and related strategies) to achieve ‘maintain, protect and enhance’ outcomes for coastal environment areas over planning horizons of at least 50 years.

The assessment and evaluation of threats and the performance of existing management actions may be based on a review of existing mapping, reports and studies and identified

opportunities to enhance a coastal environment area, including current initiatives that may be included in CZMPs or other plans and programs.

Coastal environment areas may overlap with the marine estate (as defined in the MEM Act), in areas such as:

- coastal waters of the State
- estuaries, up to the influence of the highest astronomical tide
- coastal lakes and lagoons that are permanently, periodically or intermittently open to the sea, including bed, banks and riparian areas
- coastal wetlands including saltmarsh, mangroves and seagrass
- lands immediately adjacent to or in the immediate proximity of the coastal waters of the state that are subject to oceanic processes including beaches, dunes, headlands and rock platforms.

When assessing threats and risks to the coastal environment area, councils may also consider the information that has been compiled in

- the Threat and Risk Assessment (TARA) for the Marine Estate
- the Risk-based framework for considering waterway health outcomes in strategic land use planning decisions (OEH 2017).

In Stage 1, compilation and assessment of existing information is designed to assist council to:

- Identify management objectives and outcomes for coastal environment areas.
- Review the statewide maps of coastal environment areas and compare them with existing local studies and mapping.
- Identify whether a planning proposal will be prepared in relation to the mapping of the coastal environment area.
- Establish a baseline and review information about the trends in the condition of the coastal environment area, using the most up-to-date information that is available (including measures of water quality, ecosystem health and human health).
- Identify any gaps in knowledge about coastal environment areas.
- Identify current and future threats to the resilience and functions of coastal environment areas (and relevant proximity areas), over planning horizons of at least 50 years.
- Review how coastal environment areas are currently managed and evidence about the success of current management approaches in reducing vulnerability and threats. This may include a review of existing planning instruments and practices to achieve coastal management objectives over planning horizons of at least 50 years.
- Identify potential vulnerabilities of the existing ecosystems, opportunities to improve their resilience and adapt to the impacts of climate change.
- Identify opportunities to enhance outcomes for coastal environment areas to achieve the relevant coastal management objectives. This could include enhancing biodiversity, rehabilitating and restoring degraded areas, mitigating contaminated areas, establishing connectivity corridors and facilitating habitat migration.

The CM SEPP (Schedule 1) lists sensitive coastal lakes. These lakes require comprehensive protection; therefore, management of the catchments of these areas may be a consideration in the scope of a CMP for a coastal environment area.

Where a council demonstrates that the catchment of other estuaries and coastal lakes and lagoons is a critical factor in estuary health, the catchment area may be nominated as part of a planning proposal to amend the coastal environment area maps in the CM SEPP.

Issues and threats in coastal environment areas

When scoping a CMP for a coastal environment area, it is desirable that council consider the relevance of a range of issues and threats, including but not limited to those listed below. Issues and threats may relate to the coastal waters of New South Wales, estuaries, coastal lakes and lagoons, and the foreshores of coastal waters, estuaries, lakes and lagoons.

Council is also advised to consider whether the area mapped as the coastal environment area in the CM SEPP is consistent with their local assessment and mapping of the relevant environmental features in the coastal landscape.

Examples of issues affecting coastal waters and waterways:

- changed water level and salinity regimes due to entrance management to overcome flooding issues
- entrance management and its impacts on health and ecology of a water body
- estuary, lake and lagoon health considerations, particularly water quality
- excessive collection of invertebrate species and/or overfishing
- excessive nutrient loads
- extent and condition of marine and aquatic vegetation communities, including seagrass, mangrove, saltmarsh, benthic communities and intertidal communities on rocky shores
- heavy metal contamination and pollutants
- impacts on groundwater dependant ecosystems and aquifer recharge
- inappropriate access arrangements such as moorings over seagrass endangered ecological communities and the effects of boat wash
- litter such as plastics, micro-plastics and fishing line
- location and management of public infrastructure, especially discharge points for stormwater or other drainage systems
- low acidity events
- low dissolved oxygen events
- migration of foreshore flora and fauna with water level change
- riverbank (river estuary) erosion and loss of riparian habitats
- shoreline erosion/accretion history and trends
- structures that restrict migration of habitats.

Examples of issues affecting foreshores of coastal waters of the state (including headlands, beaches and dunes), estuaries and coastal lakes:

- acidification (acid sulfate soils)
- changing groundwater levels
- clearing of foreshores
- drainage works
- effects of changes to land tenure on the management of the coastal environment area
- extent and condition of estuary and lake foreshore, headland and dune vegetation
- flood mitigation works and structures
- foreshore erosion, reclamation or dredging
- grazing in riparian zones
- impacts on migratory waders and other coastal bird species
- impacts on the geomorphic processes, features and values of coastal dunes
- impacts on threatened plants and animals
- inappropriate access arrangements such as 4WD, trail bike or quad bike tracks over coastal dunes and on coastal headlands
- intermittent tidal and coastal inundation of foreshores
- invasive plant and animal species
- ongoing erosion in frontal dunes, that undermines coastal vegetation or exposes sensitive vegetation to salt impacts
- over exploitation of coastal aquifers
- persistent inundation by tidal waters
- presence of private land in the coastal environment which is the subject of a formal private conservation agreement
- reduced biodiversity and connectivity corridors
- sediment run-on and/or discharge
- sedimentation and siltation
- the hazard posed by ingress of seawater
- the impacts of sea level rise and other aspects of climate change on existing conservation areas including marine park conservation zones, national parks, state conservation areas and Crown reserves
- urban expansion including management of the quality and quantity of water runoff from urban development and vegetation clearance.

1.6.4 Coastal use areas

Section 9(2) of the CM Act states –

*The management objectives for the **coastal use area** are as follows:*

a. *to protect and enhance the scenic, social and cultural values of the coast by ensuring that:*
   i. *the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and*
   ii. *adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and*
   iii. *urban design, including water sensitive urban design, is supported and incorporated into development activities, and*
   iv. *adequate public open space is provided, including for recreational activities and associated infrastructure, and*
   v. *the use of the surf zone is considered.*

b. *to accommodate both urbanised and natural stretches of coastline.*

This section applies when a CMP is being prepared for coastal use areas. Coastal use areas are lands adjacent to coastal waters, estuaries, coastal lakes and lagoons, where impacts of development on the use and enjoyment of the beaches, dunes, foreshores, lakes and the ocean need to be considered.

In Stage 1, compilation of information will assist council to:

- determine the baseline or current condition of the relevant assets and values in the coastal use area
- identify any gaps in knowledge about coastal use areas
- identify relevant land use planning processes and policies, processes and practices that provide the framework for coastal design, coastal access and use, visual amenity and coastal risk management
- identify whether a planning proposal will be prepared in relation to the mapping of the coastal use area.

Access, use and amenity

It is recommended that the scoping study considers the costs and benefits and community satisfaction associated with assets and facilities which support coastal access, use and amenity values including (as relevant), but not limited to:

- beach access ways, including paths, stairs and ramps, and including access for people with a disability
- boat launching ramps
- carparks at beaches and headlands
- entrance training walls including access for fishing and observation
- foreshore promenades (e.g. on a seawall or breakwater)
- foreshore reserves
- jetties and wharves

- lookouts and viewing platforms; consider also the safety and visual amenity of these assets
- marinas and moorings
- off-road vehicle access ways
- pedestrian paths and cycleways, on foreshores, dunes and headlands
- picnic facilities and playgrounds
- public transport access points
- safety of surfers and swimmers
- signage, safety rings and rescue points
- specific use access such as commercial beach haul fishing
- surf clubs, surf rescue craft access ways and surf life-saving lookouts
- the balance between development and naturalness
- the social and economic value of national surfing reserves and other surf breaks
- toilet blocks and showers
- water sensitive urban design.

The scoping analysis may be based on existing documents and include a review of the outcomes of consultation conducted for the Community Strategic Plan or for coastal recreation planning or for economic development planning for coast-dependent businesses.

Councils may also consider the ways in which they currently generate revenue from the coastal zone, such as rates, parking fees, or other council sponsored events. The review of the coastal use area may identify gaps in the provision of assets and facilities that support coastal access and amenity for appropriate coastal uses.

Some councils may choose to conduct an initial community use survey during the scoping stage, to gain a better understanding of which assets are most valued by coast users and why.

Social, cultural and heritage assets

Where a CMP is to be prepared to address social, cultural and heritage issues, the aim in Stage 1 is to identify known social, cultural and heritage assets and values which are threatened by coastal hazards or by coastal uses.

These cultural and heritage assets could include (but are not limited to):

- Aboriginal sites (objects) and Aboriginal Places (as specified in the Aboriginal Heritage Information Management System (AHIMS) register and protected under the *National Parks and Wildlife Act 1974*), and places that have traditional Aboriginal resource or cultural connections, or are identified in local Aboriginal cultural heritage studies.
- Historic heritage places that are listed in the NSW and local government heritage lists. These could include:
    - historic shipwreck sites
    - historic wharves, or coast-dependent industry sites (e.g. related to ports, fisheries, whaling or other uses)
    - historic military sites and infrastructure.
- Cultural landscapes that are identified in state or local heritage registers.
- National surfing reserves.

- Other cultural places that are significant at the local scale and are identified by local Aboriginal and other community stakeholders.

State heritage listings and local heritage studies may provide relevant information about these sites and places.

In relation to Aboriginal cultural and heritage sites and places, the views of the local Aboriginal community are important. Separate and specific culturally appropriate consultation about the management of Aboriginal sites, places and cultural landscapes may be necessary and permission must be obtained for the publication of specific cultural information, including the locations of sites and places.

Coastal urban design

Where a CMP is to be prepared to address urban design issues, the five principles of urban design described in the *Coastal Design Guidelines for NSW* (2003) are relevant. The principles help define elements of the public domain and the built form to best reflect and protect the natural beauty of the coast.

The principles are:

- defining the footprint and boundary of the settlement
- connecting open spaces
- protecting the natural edges
- reinforcing the street pattern
- ensuring that building type, height, bulk and form relates to a site's natural features and its location within a settlement.

In Stage 1, councils are advised to consider the extent to which existing urban design is consistent with the principles and any opportunities to enhance the coastal living experience, minimise risk and create social and economic opportunities for the future. Councils may also consider how both urbanised and natural stretches of coastline are being accommodated.

CMPs for coastal use areas may also consider urban design issues in conjunction with urban land use planning (through regional strategies, LEPs and DCPs) in relation to resilience to coastal hazards.

The direction by the Minister for Planning under section 9.1 of the *Environmental Planning and Assessment Act 1979* for coastal management requires that councils not prepare planning proposals for rezoning that would enable increased development or more intensive land use on land:

- in a mapped coastal vulnerability area identified in the CM SEPP
- identified as being affected in areas exposed to current and or future risk from coastal hazards in a study, assessment or plan undertaken by or on behalf of a public authority or the relevant planning authority
- within a coastal wetlands and littoral rainforests area identified in the CM SEPP.

1.7 Identify roles and responsibilities

Section 1.2.1 discusses the identification of stakeholders with interests in the preparation and implementation of the CMP.

In addition to preparing an engagement strategy outlining how it will engage with stakeholders, a council is advised to document:

- how the scope of the CMP relates to the roles and responsibilities of adjoining councils and public authorities
- when information and feedback is expected to be required from other councils and public authorities
- issues to be addressed in the CMP where councils will seek a collaborative approach.

1.8 Determine where action is required

1.8.1 Identify knowledge gaps

A consolidated list of knowledge gaps identified for each of the coastal management areas will assist to plan for additional studies to be undertaken in Stage 2. These will include gaps in knowledge and understanding of:

- coastal hazards and threats
- natural, social, cultural and economic coastal values and assets (including built assets and infrastructure), which contribute to risks and opportunities
- socioeconomic information necessary to evaluate potential management options.

This scope forms part of the work to be completed in subsequent stages of the CMP.

1.8.2 Apply a first-pass risk assessment

Section 21 (3) (b) of the CM Act requires councils to follow a risk management process when preparing their CMPs and identifying where management actions are required. This includes identifying and assessing risks to environmental, social and economic values and benefits and evaluating and selecting management actions to address those risks.

In Stage 1, councils prepare a first-pass risk assessment. This is a qualitative risk assessment using available information, to help inform the scope of the CMP.

In Stage 2, councils may refine the risk assessment through a detailed process, which incorporates additional information from studies prepared in Stage 2.

In Stage 3, councils identify and evaluate management actions to address the identified risks. It is critical that stakeholders are engaged throughout this process.

The AS/NZS ISO 31000: Risk Management – Principles and Guidelines outlines a process for risk management and defines many of the common terms associated with risk management practice.

Overview of risk assessment principles

The purpose of a risk assessment is to highlight priorities for management actions while recognising the inherent uncertainties associated with natural systems, future scenarios and the management of the coast. Despite these uncertainties, councils are required to make coastal management decisions that make best use of incomplete knowledge.

Risk is a function of the likelihood of a hazard or threat occurring and the consequences of the hazard or threat, with the consequences combining the concepts of magnitude, sensitivity and duration (**Tables B1.1** and **B1.2** show examples of a consequence and likelihood scale).

Figure B1.4 outlines the steps involved in the risk management process.

In general terms:

- **Exposure** is the potential for assets or values to be impacted by a hazard or threat.
- **Hazards and threats** are dangerous phenomena, substances, human activities or conditions that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.
- **Likelihood** refers to the chance or probability that a hazard or threat will occur within a specified timeframe or planning horizon.
- **Consequences** refers to the outcome or impact of a hazard or threat.
- **Sensitivity** is the degree to which a community or ecosystem is affected by a coastal hazard or threat.
- **Vulnerability** is a function of exposure, sensitivity and adaptive capacity. It can apply to built and natural assets as well as communities and economies.
- **Adaptive capacity** is the ability of a system (human or natural) to adjust to hazards or threats (including variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.
- **Resilience** is the ability of a system (human or natural) to resist, absorb and recover from the effects of hazards and threats in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity.
- **Potential impacts** include damage, harm or losses to exposed communities, property, services, livelihoods, ecosystems and the environment.

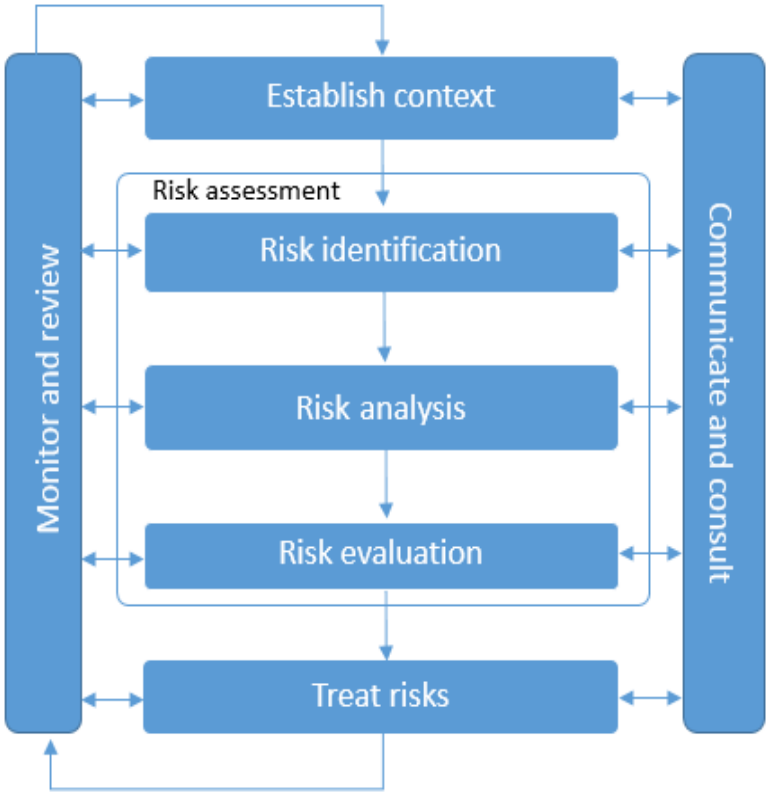

Figure B1.4 Risk management process (Source: AS/NZS ISO 31000: Risk Management – Principles and Guidelines)

First-pass risk assessment

A first-pass risk assessment is a relatively straightforward way to prioritise the threats to the coastal environment and risks from coastal hazards. The goal is to identify what values and assets might be at risk and then establish whether the risk is large enough to warrant a more detailed assessment. At this stage, the risk assessment will be based on existing information.

Sometimes the risk is sufficiently small, or so far in the future, that further investigation is not required and that continuing current management arrangements in a CMP will manage the risk or threat. This category of risk may be referred to as acceptable or tolerable.

Conversely, the risk assessment may demonstrate that the resourcing of a more in-depth assessment of a particular risk or threat is a priority and that additional information may need to be collected as part of Stage 2.

A first-pass assessment can be undertaken using existing information such as regional mapping, simple conceptual or numerical models and expert judgement. The levels of risk are generally qualitative.

When undertaking a first-pass risk assessment, it may be helpful to consider the regional priority risks identified through the Threat and Risk Assessment (TARA) for the Marine Estate.

Where a CMP will be addressing coastal hazards, the first-pass risk assessment may involve overlaying available hazard mapping over various GIS layers held by council (such as assets and zoning layers). This may highlight where more robust information will be required in later stages to give an understanding of risk.

The assessment process should be systematic and demonstrate that both likelihood and consequence have been considered. This generally involves applying qualitative scales of likelihood and consequence. Likelihood and consequence scales that are consistent with national risk standards, but are tailored to consider the objectives of the council and its communities and other risk assessments conducted by their organisation are appropriate.

The information and assessment can be recorded in a simple spreadsheet.

Tables B1.1 and **B1.2** provide generic examples of scales of consequence which are relevant to coastal contexts. **Tables B1.3** and **B1.4** provide examples of likelihood scales. Scales from the Marine Estate Threat and Risk Assessment (TARA) describe consequences and likelihood at the spatial scale of the NSW environment and the NSW community.

Table B1.1 Example of consequence scale (Source: AGO 2006)

Rating	Success criteria				
	Public safety	**Local economy and growth**	**Community and lifestyle**	**Environment and sustainability**	**Public administration**
Catastrophic	Large numbers of serious injuries or loss of lives	Regional decline leading to widespread business failure, loss of employment and hardship	Region would be seen as very unattractive, moribund and unable to support its community	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Public Administration would fall into decay and cease to be effective
Major	Isolated instances of serious injuries or loss of lives	Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth	Severe and widespread decline in services and quality of life within the community	Severe loss of environmental amenity and danger of continuing environmental damage	Public administration would struggle to remain effective and be seen as in danger of failing completely
Moderate	Small numbers of injuries	Significant general reduction in economic performance relative to current forecasts	General appreciable decline in services	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Public administration would be under severe pressure on several fronts
Minor	Serious near misses or minor injuries	Individually significant but isolated areas of reduction in economic performance relative to current forecasts	Isolated but noticeable examples of decline in services	Minor instances of environmental damage that could be reversed	Isolated instances of public administration being under severe pressure
Insignificant	Appearance of a threat but no actual harm	Minor shortfall relative to current forecasts	There would be minor areas in which the region was unable to maintain its current services	No environmental damage	There would be minor instances of public administration being under more than usual stress but it could be managed

Table B1.2 Social and economic consequence scale (adapted from the NSW Marine Estate TARA, MEMA 2017)

Consequence level	Consequence of impacts on social and economic benefits
Insignificant	No or barely discernible negative impacts on the social and economic benefits enjoyed by the NSW community are or will be evident on a statewide scale. There may be minor impacts on the social and economic benefits derived in one region, or across one sector or user group.
Minor	Discernible and/or temporary negative impacts on the social and economic benefits enjoyed by the NSW community are or will be evident on a statewide scale. There may be moderate impacts on the social and economic benefits derived in one region, or across one sector or user group.
Moderate	Measurable and ongoing negative impacts on the social and economic benefits enjoyed by the NSW community are or will be evident on a statewide scale. There may be major impacts on the social and economic benefits derived in one region, or by one sector or user group.
Major	Substantial measurable and ongoing negative impacts on the social benefits enjoyed by the NSW community are or will be evident on a statewide scale. There may be catastrophic impacts on the social and economic benefits derived in one region, or across one or more sector or user group.
Catastrophic	Significant ongoing and/or permanent negative impacts are or are almost certain to be evident on social and economic benefits enjoyed by the NSW community that are widespread and affect a large proportion of the sectors and user groups (including the broader community).

Table B1.3 Example of likelihood scale (Source: AGO 2006)

Rating	Recurrent risk	Single event
Almost certain	Could occur several times per year	More likely than not: probability greater than 50%
Likely	May arise about once per year	As likely as not: 50/50 chance
Possible	May arise about once in 10 years	Less likely than not but still appreciable: probability less than 50% but still quite high
Unlikely	May arise about once in 25 years	Unlikely but not negligible: probability noticeably greater than zero
Rare	Unlikely during the next 25 years	Negligible. Probability very small, close to zero

Table B1.4 Likelihood scale relevant to social and economic objectives (adapted from NSW Marine Estate TARA, MEMA 2017)

Likelihood level	Likelihood of impacts
Rare	Never reported for this situation, but still plausible within the timeframe (< 5%).
Unlikely	Uncommon, but has been known to occur elsewhere. Expected to occur here only in specific circumstances within the timeframe (5-30%).
Possible	There is clear evidence to suggest this is possible in this situation within the timeframe (30-50%).
Likely	Expected to occur in this situation within the timeframe. There is a history of frequent occurrence (50-90%).
Almost certain	Very likely. A very large certainty that this will occur in this situation within the timeframe; a history of regular occurrence (>90%).

The risk assessment involves attributing likelihood and consequence from the adopted scales for each hazard or threat. These are entered in a risk rating matrix to provide an overall risk rating for each hazard or threat.

This part of the process enables risks to be ranked and prioritised. An example of a risk rating matrix is shown in **Figure B1.5**.

	Consequence				
Likelihood	**Insignificant**	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	**Medium**	**High**	**High**	**Extreme**	**Extreme**
Likely	**Medium**	**Medium**	**High**	**High**	**Extreme**
Possible	**Low**	**Medium**	**High**	**High**	**High**
Unlikely	**Low**	**Low**	**Medium**	**Medium**	**High**
Rare	**Low**	**Low**	**Medium**	**Medium**	**High**

Figure B1.5 Generic risk assessment matrix (Source: AGO 2006, Climate Change Impacts and Risk Management: A guide for business and government, report by Broadleaf International & Marsden Jacobs Associates for the Australian Greenhouse Office, Canberra)

Information from the first-pass risk assessment can be used to provide a broader understanding of the risks and help identify:

- where the overall risks are low or very low, because the consequences are insignificant or the likelihood is barely credible
- which current and emerging management issues are a priority for their CMP
- which issues and geographic areas may need to be examined in more detail and where further studies or mapping may be required in Stage 2
- where the level of risk has not been reduced to an acceptable level by current management actions and further management actions will be required
- where risks are likely to increase in the foreseeable future due to changes in the hazards, the area impacted or the vulnerability of assets and values
- where there may be significant gaps in knowledge and understanding of hazards, threats and uncertainties

- where additional socioeconomic information may be required to identify or evaluate management actions and make decisions in Stage 3
- where there is potential exposure of public and private assets to physical, structural, ecological or public safety hazards
- where and when there may be opportunities to reduce the impacts and liability of coastal hazards and threats and reduce private and public losses
- matters for engagement with decision-makers and stakeholders
- where there may be new opportunities to enhance the wellbeing of coastal communities given anticipated increases in population and associated development pressures.

It is important that the process and the information compiled is well documented as this will act as a baseline for any later risk assessments. However, in some low-risk situations, the available data, knowledge and understanding of the local coastal systems may be insufficient to support anything other than a first-pass risk assessment. Where there is insufficient information to assess the risk, a precautionary approach is advised and the risk should be further considered in later stages.

Where the first-pass risk assessment indicates that a more detailed economic evaluation or cost-benefit analysis is likely to be required, additional studies may include:

- preparation of a comprehensive asset register, including built assets, natural assets and sociocultural assets
- detailed socioeconomic analysis and stakeholder profiling (including non-resident landowners and others with business interests in the area)
- detailed estimates of potential costs of actions
- clear identification of beneficiaries, the value of benefits and distribution analysis.

It is intended that the information provided by the first-pass risk assessment:

- is suitable for supporting initial discussions with communities and stakeholders about key management issues and management options
- will inform clear recommendations about any additional studies to be prepared in Stage 2 so that appropriate information is available to support the option identification and evaluation of actions in Stage 3.

In general, a detailed risk assessment will be required when there are proposals for significant new infill or greenfield development in areas exposed to current and future risk from coastal hazards, or there is a high degree of uncertainty.

Table B1.5 gives an example vulnerability scale for various land uses. Where there is a very strategic or high-value land use it may be pertinent to look at extremely rare scenarios during Stage 2.

Table B1.5 Land use vulnerability classification (modified from Guidance – Flood risk and coastal change, UK Department for Communities and Local Government 2014)

Classification	Land use
Most vulnerable uses	Hospitals, police stations, command centres, ambulance stations and telecommunications used for disaster response, isolated dwellings, housing (including group homes) and residential care facilities for seniors and disabled persons, prisons, childcare facilities and accommodation associated with an educational establishment, mobile homes used for permanent residential purposes.
Highly vulnerable uses	Multi-dwelling housing, dual occupancy, residential accommodation, residential flat building, backpackers' accommodation, boarding house, hostel, hotel accommodation, moveable dwelling, caravan park, serviced apartment, tourist and visitor accommodation.
Less vulnerable uses	Commercial development, shops, financial and professional services, restaurants and cafes, hotels, offices, general industry, agriculture and forestry, waste treatment, short-term caravans and camping (subject to early warning and evacuation plans).
Essential infrastructure	Essential transport and utility infrastructure, power stations, primary substations, sewage treatment plants and water treatment works.
Compatible uses	Coastal hazard and flood mitigation structures, water supply infrastructure and pumping stations, docks, marinas and wharves, shipbuilding, water-based recreation, surf clubs, amenity and open space, nature conservation and biodiversity, outdoor sports and recreation facilities and changing rooms.

This first-pass risk assessment is essentially a tool for the prioritisation of risks to identify those that need to be further assessed in subsequent stages of the CMP.

A key consideration in identifying the necessary further assessments and risk management actions will be the risk tolerance. This needs to be locally specific and evaluated with the local community. A council and its community may evaluate a risk to be acceptable, tolerable or unacceptable. Examples of the definition of these levels of risk tolerance are provided in **Table B1.6**.

Table B1.6 Definitions of acceptable, tolerable and unacceptable risk

Acceptable risk	A risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk further. Individuals and society can live with this risk without feeling the necessity to reduce the risk any further.
Tolerable risk	A risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believes that as much as is reasonably practical should be done to reduce the risk further.
Unacceptable risk	A risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures are to be put in place to reduce the risk to at least a tolerable level. Generally, in a council or public authority, unacceptable risks and proposed risk treatments will need to be reported to and accepted by senior decision-makers. Regular review of progress in reducing the risk will be required.

Figure B1.6 shows the relationship between the first-pass risk assessment, and the studies and detailed risk assessment in Stage 2 linked to risk treatment options in Stage 3.

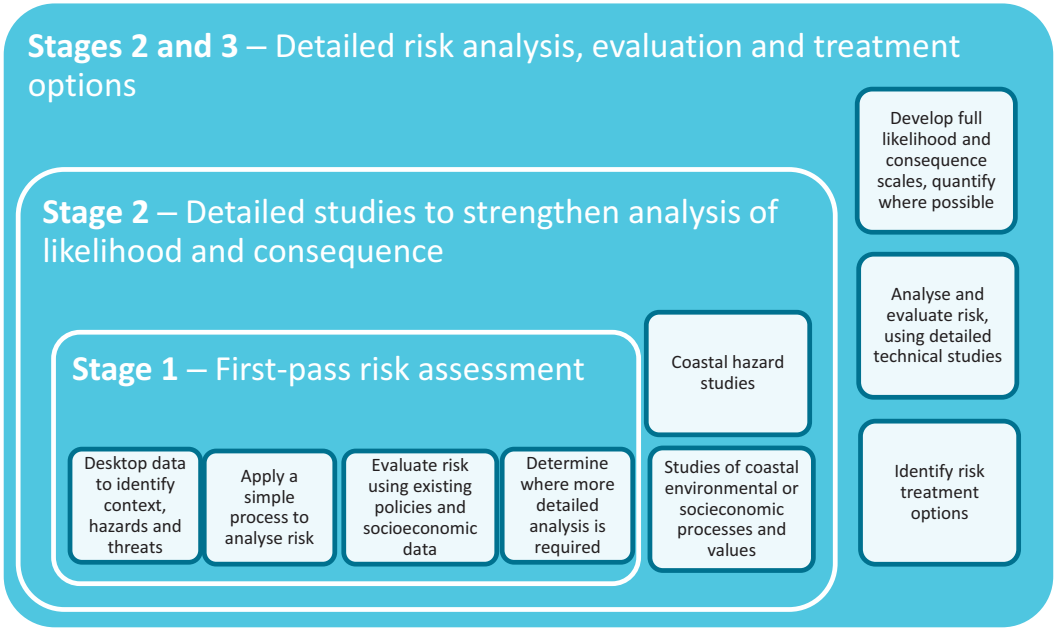

Figure B1.6 Stage 1 first-pass risk assessment as a subset of the Stages 2 and 3 risk management process

1.9 Prepare a preliminary business case

A preliminary business case can be used to gain support and commitment to undertake additional studies and activities that are required to prepare a CMP. Note that a detailed business plan must be included in a CMP to support implementation of the coastal management actions contained in a CMP.

Matters that may be considered in the preparation of the preliminary business case include:

- the complexity of management issues and decisions
- the level of understanding about coastal issues and coastal change
- the level of uncertainty about risks and outcomes
- the budget allocated to coastal management activities
- the capacity and willingness of the community and other private and public entities to contribute to the future cost of coastal management, particularly to the ongoing cost of management in areas exposed to current and future risk from coastal hazards or coastal vulnerability areas
- the value of economic activity in the area that is dependent on the coast (such as commercial and recreational fishing, tourism and surfing-based businesses)
- the economic and ecosystem service value of a healthy coastal environment
- the potential cost and liability of future coastal impacts if known threats are not addressed; conversely the added social, economic and environmental value if coastal threats and opportunities are well managed
- how council currently generates funding and allocates resources to priorities and whether these sources and mechanisms are sustainable for coastal management
- the proposed timeframe for preparing the CMP.

1.10 Presentation of the scoping study

The scoping study will consolidate information gathered during Stage 1 and outline the proposed pathway through the other stages of preparing a CMP.

Key components of a scoping study include:

1. A description of the strategic context of coastal management.
2. The purpose, vision and objectives of the CMP.
3. The scope of the CMP, including management issues and the spatial extent of management areas.
4. A review of the effectiveness of current management practices and arrangements, including identification of changes required to manage the relevant coastal management area(s) effectively.
5. Details of roles and responsibilities and how the council will be working with other councils or public authorities – particularly where coastal sediment compartments or an estuary catchment is shared between councils.
6. Results of a first-pass risk assessment and details of where action is required including any additional studies that are proposed to fill knowledge gaps.
7. A stakeholder and community engagement strategy. If council intends to prepare a planning proposal, the engagement strategy is also advised to consider the requirements set out in relevant guidelines for preparing a planning proposal.
8. A preliminary business case to prepare a CMP.
9. A forward plan for subsequent stages of the CMP process – including any fast-track proposals and how the stages will align with council's IP&R framework.

Figure B1.7 summarises the key components of the scoping study.

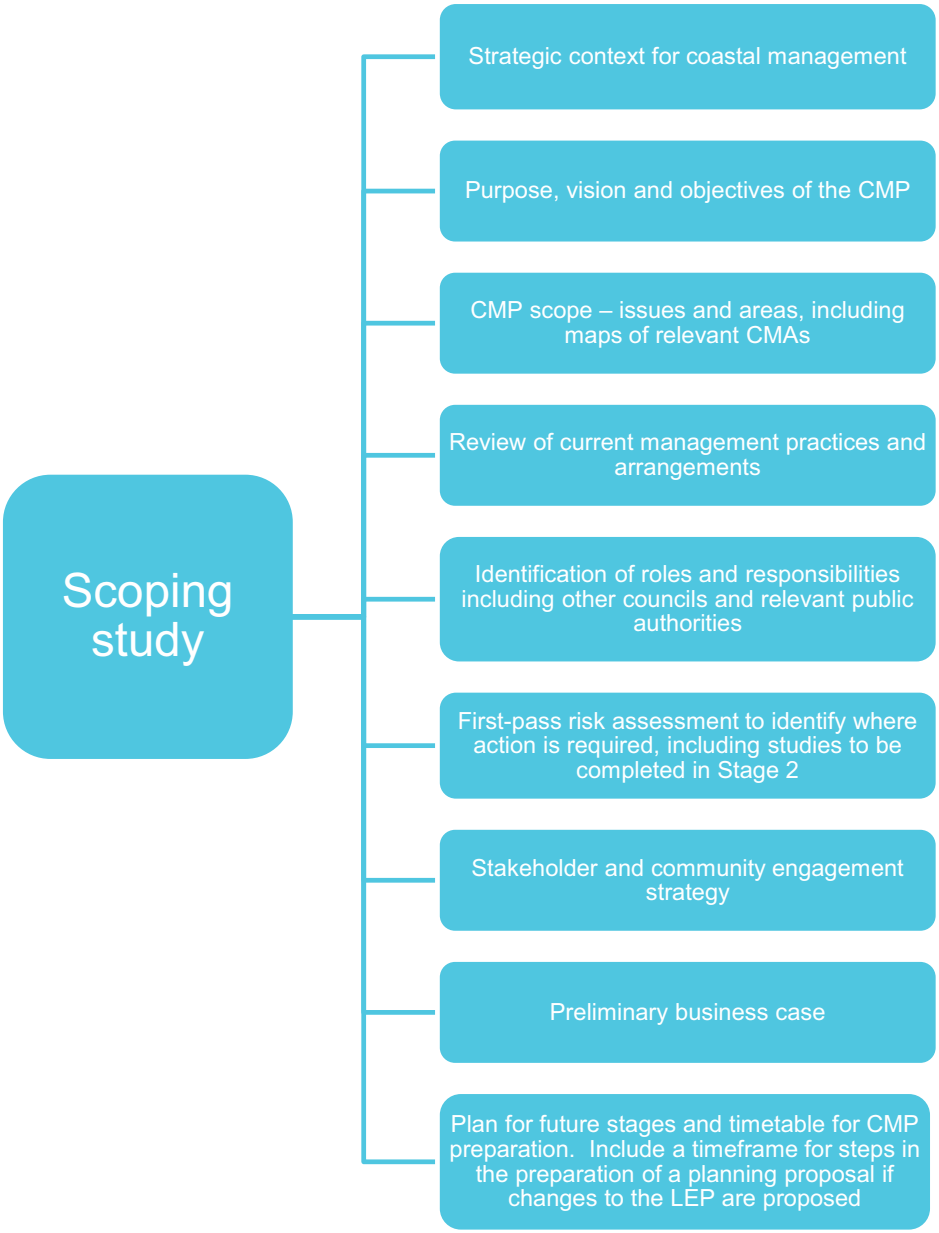

Figure B1.7 Components of the scoping study

1.11 Subsequent stages of the CMP

1.11.1 Studies to be prepared in Stage 2

The scoping study may identify further studies that will be prepared in Stage 2 to fill knowledge gaps, to refine the risk assessment and to support option evaluation and decisions about priorities.

Relevant information regarding each recommended study includes:

- why the further study is recommended and how it will be used in preparing the CMP
- where it will be conducted
- whether council will do the work in-house or seek external expertise
- the anticipated scheduling of the work.

1.11.2 Deciding whether to fast-track the planning process

In some cases, council may 'fast-track' from stage 1 to 4, or only complete parts of stages 2 to 3. A fast-track process for the preparation or review of a CMP may be appropriate where:

- the first-pass risk assessment indicates that the vulnerability is low and the risks are acceptable
- the management issues are not complex and the council can demonstrate that they are adequately managed
- there are few stakeholders and/or there is an existing, successful management partnership between stakeholders, including adjoining councils, public authorities and key community groups
- council has previously prepared a detailed study to evaluate all relevant coastal hazards and risks and has robust, up-to-date scientific information about coastal change, and
- council has a clear understanding of trends in the condition of natural systems in the coastal environment area, and the ecosystem services they provide, based on up-to-date scientific evidence
- the council demonstrates that it has adopted and is implementing best practices in its role in protecting the condition of the coast
- there have been no major events or new studies released that would change the previous assessment of risk, including likely changes in socioeconomic conditions
- council has a clear understanding of community satisfaction with coastal management processes, costs and benefits distribution and outcomes, that supports continuation of the current approach
- council has a sustainable funding strategy in place for coastal management, which is integrated with its resourcing strategy and asset management plan under the IP&R process.

1.12 Review of the scoping study

At the conclusion of Stage 1, a council may take the opportunity to provide a copy of its scoping study to OEH for review. A council or OEH may, through the Minister, seek advice from the NSW Coastal Council.

If requested by the Minister, the NSW Coastal Council's advice may be sought on:

- whether the scoping study is acceptable
- whether any fast-track proposals are appropriate
- any issues that require further consideration in subsequent stages.

1.13 Planning ahead

Before concluding Stage 1 councils should consider what steps are required to finalise the preparation of a CMP. Considerations for council officers include:

- Confirming internal governance arrangements for preparation and implementation of the CMP. This may include establishing committees or changing the terms of reference for an existing group.
- Preparing a briefing package for senior council officers, councillors and the community, highlighting what will be involved in preparing the remaining stages of the CMP.
- Confirming with relevant public authorities (including adjoining councils) how they will be involved in subsequent stages of the preparation of the CMP, including a discussion of timeframes.
- Consulting the community about the next steps and timeframes.
- Preparing the briefs for Stages 2–4 of the preparation of the CMP, ensuring the scope is consistent with the findings of Stage 1.
- Confirming how the budget requirements for subsequent stages will be met.
- Compiling information required for completion of subsequent stages including funding and financing mechanisms.


Our future on the coast
NSW Coastal Management Manual Part B:
Stage 2 – Determine risks, vulnerabilities
and opportunities
NSW
GOVERNMENT

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Determine risks, vulnerabilities and opportunities

Stage 2 involves undertaking detailed studies that help councils to identify, analyse and evaluate risks, vulnerabilities and opportunities.

This includes:

- engaging with the community and stakeholders
- refining understanding of key management issues
- identifying areas exposed to coastal hazards and threats to coastal values
- analysing and evaluating current and future risks (detailed risk assessment)
- identifying scenarios for social and economic change and related opportunities for coastal communities
- preparing a planning proposal to amend maps of coastal management areas, to commence the Gateway process
- identifying timing and priorities for responses, thresholds and lead times.

2.1 Overview of Stage 2

The following sections of the *Coastal Management Act 2016* and associated mandatory requirements in Part A are most relevant to this stage.

Section 12 Purpose of coastal management programs.

Section 14 Preparation of coastal management programs.

Section 15 Matters to be dealt with in a coastal management program.

Section 16 Consultation.

Studies prepared in Stage 2 provide information to support decision-making in later stages of the planning process. The additional information assists communities to better understand coastal management issues and to analyse and evaluate coastal risks and opportunities.

Stage 2 studies may be prepared for any or all coastal management areas. These studies build on existing information about the environmental, social and economic characteristics of an area and how this may have changed over time, or is projected to change.

Studies may relate to:

- identifying and mapping the boundaries of coastal management areas
- understanding coastal processes, sediment budgets and all coastal hazards and risks as appropriate to the local government area
- understanding threats to coastal wetlands, littoral rainforests and environment areas and values
- understanding opportunities and constraints for coastal use areas and refining key coastal land use planning issues
- establishing a baseline that allows councils to monitor, evaluate and report on their achievements and performance against their management objectives
- assessing the vulnerability of communities, including factors such as socioeconomic characteristics, the sensitivity of natural assets, and the location, age and design of built assets and infrastructure
- identifying opportunities for reducing vulnerability, building resilience, strengthening adaptive capacity and enhancing the economic potential of coast-related businesses.

The studies undertaken in Stage 2 will be most beneficial when designed to reflect the scale and complexity of the issues in each coastal management area and the interrelationships between adjacent and/or overlapping coastal management areas.

Table B2.2 (in **Section 2.11**) provides examples of situations where more detailed studies are likely to be required for the four coastal management areas.

Table B2.3 (in **Section 2.11**) outlines matters to consider when identifying and designing new studies in the relevant coastal management areas.

Important considerations when planning additional studies are the current level of understanding of the issues identified in Stage 1, the time and resources available, and community and stakeholder perceptions of risks and vulnerabilities.

2.2 Intended outcomes from Stage 2

Information that is targeted and well-structured will best assist councils, stakeholders and communities to make management decisions about the coastal zone.

The outcomes of these studies may assist councils to:

- refine the mapping of coastal management areas
- provide detailed information necessary for a planning proposal to amend the mapping of coastal management areas for planning purposes in council's Local Environmental Plan (LEP)
- provide context and data to support the identification and evaluation of management options in Stage 3
- improve understanding of the complexity of issues and community perspectives
- quantify the nature and extent of exposure to coastal hazards and threats to public and private assets (both natural and built)
- understand the factors that contribute to vulnerability and to current and future risks
- define the socioeconomic characteristics such as demographics, coast-dependent economic activity, land use patterns and future development scenarios which influence vulnerability and capacity to respond now and in the future
- understand the range of potential future scenarios (see **Section 2.8.5**)
- understand the local community's attitude to risk in terms of what may be acceptable, tolerable or unacceptable (see **Table B1.4** in Stage 1)
- identify opportunities to reduce risks and enhance the environmental, social and economic values.

Communication with Councillors and other public authorities on the results of the studies undertaken and how the results will be used in the preparation of the coastal management program (CMP) is recommended.

2.3 Community and stakeholder engagement

Community and stakeholder engagement during Stage 2 adds value to the coastal planning process by:

- explaining the findings of studies completed in Stage 2. In some cases, the community and stakeholders may be involved in the design of studies
- raising awareness of the significance and complexity of the issues
- ensuring that relevant perspectives are incorporated when analysing the likelihood and consequences of events and on the acceptable and tolerable level of coastal risk for planning purposes
- preparing the community and stakeholders to participate in identification and evaluation of management options in Stage 3.

It is important that the outcomes of Stage 2 are accessible, easily understood and meaningful to the community and stakeholders. This helps build trust and commitment to the outcomes.

2.3.1 Engagement about coastal risks

It is recommended that councils communicate with the community and stakeholders about the study methods being used and any inherent uncertainties.

Detailed understanding of values and assets (both natural and built) within a coastal management area is necessary when considering likelihood, consequences and hence risk. This understanding is best developed through a structured process that includes input from the community and stakeholders, as well as technical and scientific experts.

Risk analysis and evaluation can be conducted in workshops that involve a range of affected community members, stakeholders, public authorities and experts.

Community and stakeholder engagement can also assist in:

- identifying studies and solutions that are tailored to local circumstances
- identifying opportunities for the community, public authorities and stakeholders to provide additional data and resources
- determining potential exposure, sensitivity, vulnerabilities and consequences
- identifying potential risks based on historical information and personal experience
- identifying opportunities for risk management and adaptation measures
- evaluating the acceptability or otherwise of a risk linked to any coastal hazard or threat
- developing 'community and stakeholder ownership' and acceptance of the outcomes of the risk management process.

In general, the community engagement activities in Stage 2 will be at the 'inform', 'consult', or 'involve' levels in the International Association for Public Participation IAP2 spectrum.

2.3.2 Socioeconomic studies

A socioeconomic assessment may help councils and public authorities to better understand the values, vulnerability and opportunities affecting a local community. It can help clarify social and economic risk factors and the community's acceptance of risks. It can also help identify beneficiaries and determine their willingness and capacity to pay for coastal management actions.

Table B2.4 (in **Section 2.11**) provides additional information about the issues that may be included in a socioeconomic assessment. The table also outlines the types of socioeconomic data that may be required for the evaluation of management options identified in Stage 3. Aspects to consider include projected demographics, trends in local population and changes in coastal use into the future.

The more complex the decisions required, the more comprehensive the social and economic analysis may need to be.

Consultation with residents, landowners, businesses and the wider community may give insight to:

- how people use different parts of the coastal zone
- access, use and amenity of beaches and foreshores
- the relative value of different natural and built assets and willingness to contribute to the protection of those values
- trends and scenarios for the value, access, use and enjoyment of the coast
- how information is obtained about coastal issues that may affect their livelihoods and lifestyles

- the extent to which local businesses and employment are coast-dependent.

When undertaking socioeconomic studies, councils may find useful information in the Threat and Risk Assessment (TARA) for the Marine Estate.

Figure B2.1 Community engagement activities are an important part of Stage 2, Tanja, March 2016 (Photo: D Wiecek/OEH)

2.4 Studies in coastal wetland and littoral rainforest areas

Detailed studies of coastal wetlands and littoral rainforests areas, including their proximity areas, may be required when there is evidence that current management arrangements are not achieving the relevant coastal management objectives, see *Coastal Management Act 2016* (CM Act) section 6.

Potential studies for coastal wetlands and littoral rainforests are outlined in **Table B2.5** (in **Section 2.11**). The studies can provide information for councils to make strategic coastal management and land use planning decisions at the local and regional scale.

Depending on the management decisions that are required, studies may provide information such as the:

- spatial extent and revised boundaries of coastal wetlands and littoral rainforests
- condition, connectivity and ecosystem services associated with coastal wetlands and littoral rainforests
- historical evolution of the wetland or littoral rainforest and the projected future condition

- critical factors influencing the vulnerability of coastal wetlands and littoral rainforests
- potential impacts (linked to exposure, sensitivity and vulnerability) that may result from changes in land use of adjoining areas or climate change
- potential to offset other factors that may adversely impact on the coastal wetlands or littoral rainforests
- opportunities to protect, rehabilitate, improve the resilience of, and support the social and cultural values of coastal wetlands and littoral rainforests.

Studies to support the management of coastal wetlands and littoral rainforests areas are also likely to be relevant to coastal environment areas, particularly in relation to water quality, sediment and nutrient loads and changes in hydrology (see also **Section 2.6)**.

Figure B2.2 Stage 2 studies can support improved mapping and provide information about how key threats impact on wetland health, function and services (Photo: OEH)

2.5 Studies in coastal vulnerability areas

Detailed studies may be required to determine current and future risk from coastal hazards.

Coastal hazards include:

- 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.

Studies in Stage 2 may help councils to identify the exposure and sensitivity to coastal hazards and develop an understanding of the consequences and likelihood.

The scope of the studies undertaken, the scenarios and the range of probabilities considered are best designed to reflect the types of assets and indicative risk levels obtained through the first-pass risk assessment in Stage 1.

In situations where essential infrastructure, or very strategic or high-value assets may be exposed to coastal hazards, it is important to consider the probability of extremely rare scenarios, as well as uncertainty in coastal forcing, processes and response. For further information refer to **Section 2.8.4**.

This information will assist councils to analyse the risks and evaluate management actions for areas exposed to coastal hazards (in Stage 3). It will also help councils to identify and map coastal vulnerability areas for land use planning and emergency management (see objects (a), (g) and (i) of the CM Act and the management objectives in section 7 of the CM Act).

Stage 2 studies in areas exposed to coastal hazards may consider, as relevant:

- The broad geological and geomorphic structure and evolution of the coast.
- The context for regional and local coastal processes, and how those processes have evolved and may evolve in the future.
- The spatial and temporal scale of coastal processes (including open coast, estuary and rocky headland processes).
- The development of conceptual models of sediment transport and sediment budgets. **Figure B2.3** shows the components of the coastal sediment budget.
- Sediment dynamics within and between primary, secondary and tertiary sediment compartments on the open coast and in estuaries.
- A detailed sediment budget at the local (tertiary sediment compartment) scale.
- Oceanic processes and natural variability in wave climate affecting the region and local area. These may vary at a range of timescales such as El Niño and La Niña, or the Interdecadal Pacific Oscillation (IPO).
- Factors influencing coastal water levels and coastal processes such as storm surge, coastal trapped waves and catchment flooding.
- Human modification of the coast that affects coastal processes and landforms including structures such as revetments, seawalls and training walls, reclamation works, dredging and entrance management policies.
- The potential effects of climate change including shoreline rotation, sea level rise, changes in storm type, frequency, magnitude, duration and direction, as well as other potential impacts on hydrodynamic forcing along the coast.
- The degree of uncertainty in the above factors, including climate change scenarios and inherent variability of coastal processes.

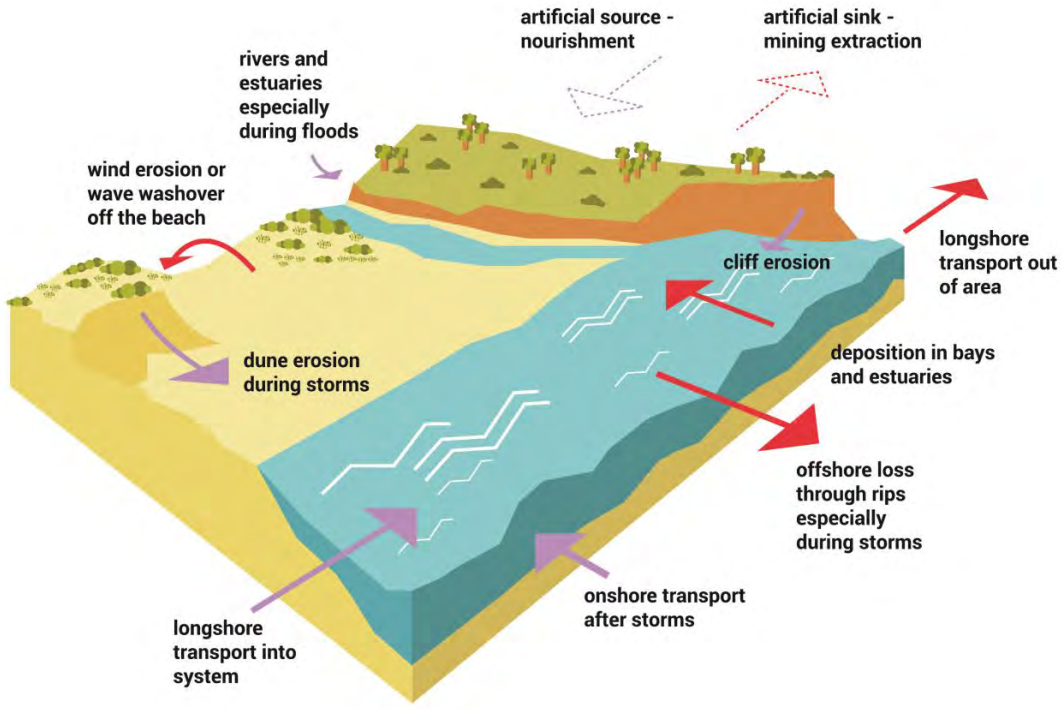

Figure B2.3 Components of the coastal sediment budget (Source: Coastal Dune Management, NSW Department of Land and Water Conservation, 2001)

Figure B2.4 shows the boundaries of primary and secondary sediment compartments in part of the NSW coast. Sediment compartment boundaries are mapped at national to regional scales and are based on criteria such as the geological structure of the coast, major topographic features such as headlands and peninsulas, dominant landforms in a section of coast and the orientation of the shoreline.

Consultation with adjoining councils where coastal processes in a secondary sediment compartment or estuary extend across the council boundary is important. There are specific consultation requirements in these circumstances under the CM Act.

NSW Coastal Management Manual Part B: Stage 2

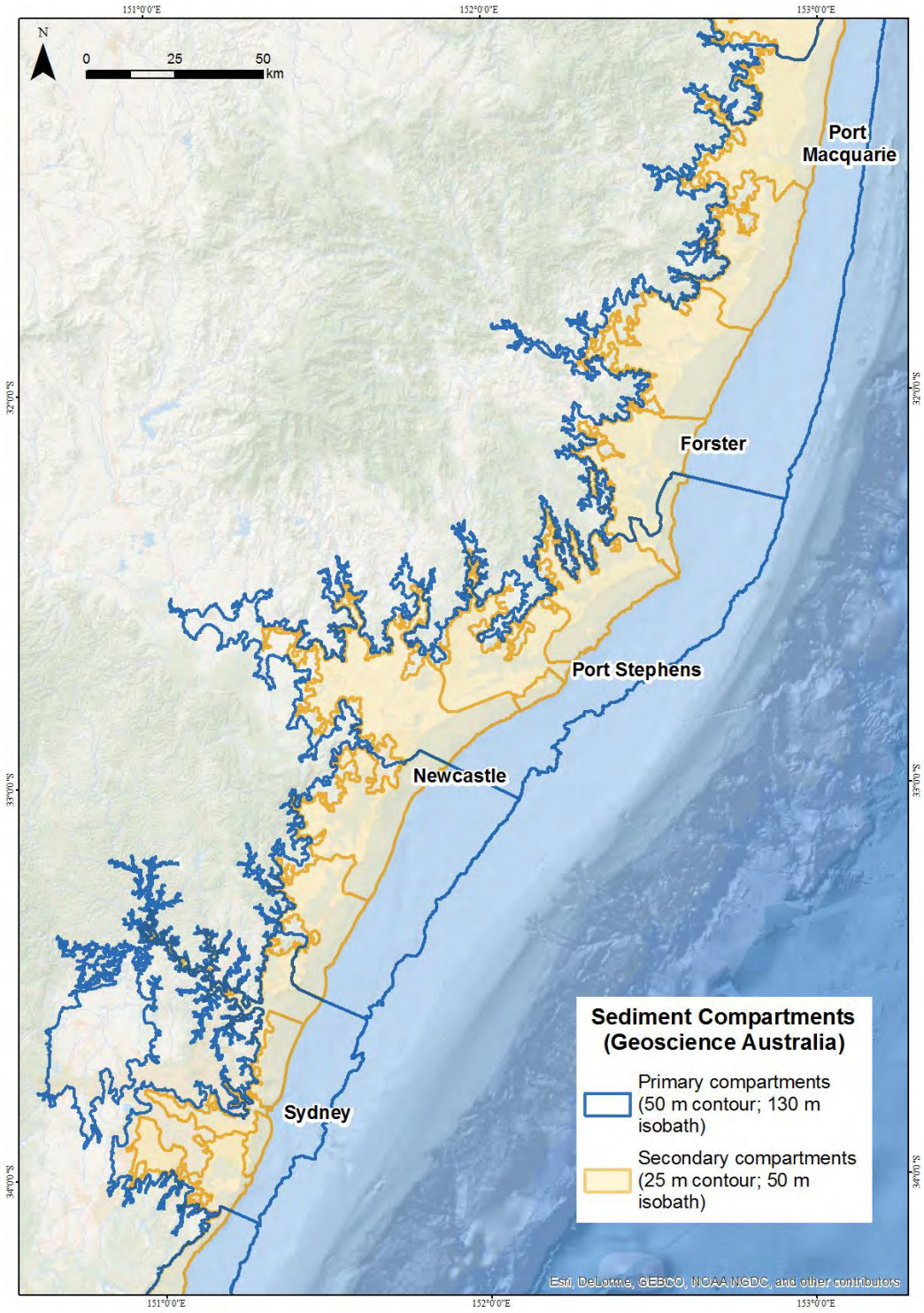

Figure B2.4 An example of primary and secondary coastal sediment compartments

2.5.1 Beach erosion and recovery

Beach erosion refers to the removal of beach materials by wave action, tidal currents, littoral currents, or wind. It is usually associated with storms or with elevated water levels and can occur on the open coast and in estuaries.

Beach erosion events are often interspersed with a beach recovery phase when sediment moves back onshore to rebuild the beach and dunes. The sediment budget is maintained in a closed sediment compartment.

The area in which beach erosion and recovery takes place is referred to as the beach fluctuation zone. **Figure B2.6** illustrates the erosion and recovery phases on a beach.

The impact of an erosion event varies with:

- recovery time since the last erosion event
- the extent to which the sediment budget at the site is affected by cyclical fluctuations, such as those due to local longshore drift, beach rotation or accretion on a tidal delta.

A consideration in studies of beach erosion is the changes in the distribution of sediment between the nearshore, alongshore, beach face, fore-dune and estuaries. This may include the effect of over-wash, coastal inundation, tidal currents, stormwater, flooding and the landward movement of sediment by wind.

Studies of beach erosion can assist to improve knowledge about the likelihood of the hazard over timeframes relevant to management of existing infrastructure and development, as well as for future planning of the coast. Timeframes to consider include immediate, 20 years, 50 years, 100 years and beyond.

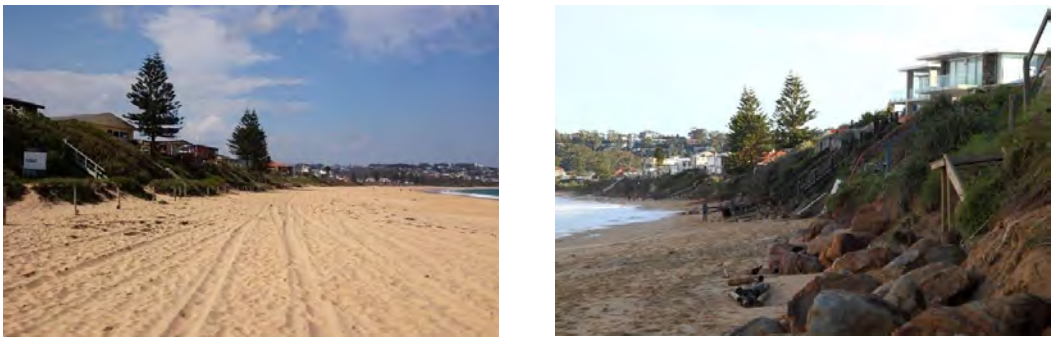

Figure B2.5 Wamberal Beach in an accretion phase (April 2016) and following storm erosion (June 2016) (Photos: M Kinsela/OEH)

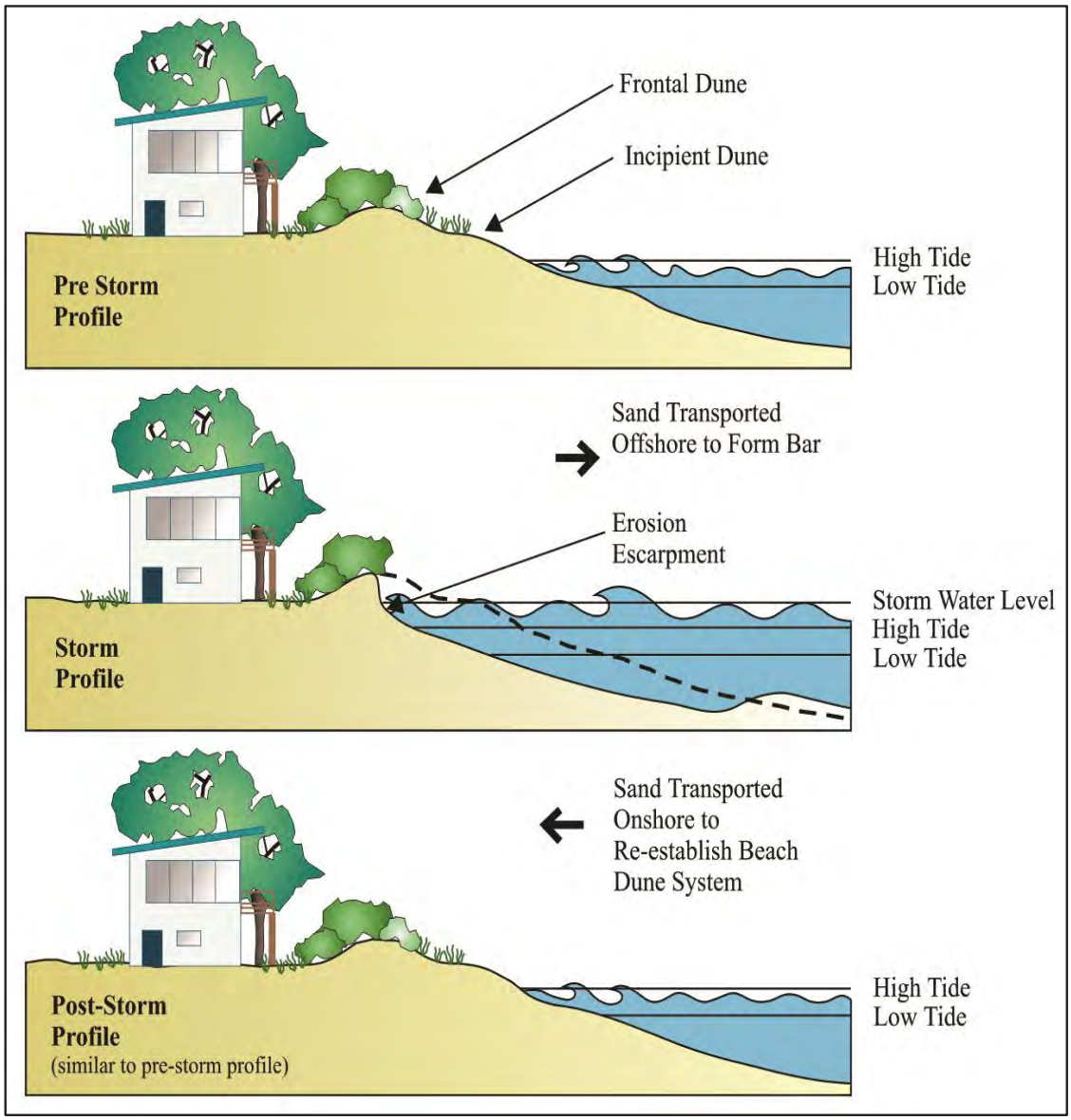

Figure B2.6 Beach erosion and recovery phases

Figure B2.7 Storm damage to Warilla seawall, including loss of access control fencing and safety signage (Photo: D Wiecek/OEH)

2.5.2 Shoreline recession

Shoreline recession refers to continuing landward movement of the shoreline or a net landward movement of the shoreline over a specified time. As shoreline recession occurs, the beach fluctuation zone is translated landward.

Recession can occur on open coast beaches and in estuaries, particularly where there may be limited opportunity for deposition and shoreline recovery. Integrated studies of beach erosion and shoreline recession will often be necessary to distinguish processes and trends operating at different time scales.

Where shoreline recession is occurring, studies may be required that consider the contributing factors and the rate of recession, such as:

- longshore sediment transport into and out of the embayment or sediment compartment, particularly where loss exceeds gains from sand moving into the embayment from up-drift sources
- offshore sand losses where rips have scoured sediment seaward during major storms
- permanent sand losses into stabilised and vegetated dunes landward of the active beach, or on headlands
- permanent interruption or exclusion of sand from the beach fluctuation zone by artificial structures
- persistent sand losses into estuary entrances
- persistent loss of finer grained sediment from estuary shorelines
- impacts of climate change and sea level rise.

Figure B2.8 summarises the steps in an integrated beach erosion and shoreline recession assessment. **Figure B2.9** shows conceptually the shoreline recession process. **Table B2.6** (in **Section 2.11**) outlines potential studies to improve understanding of beach erosion and shoreline recession.

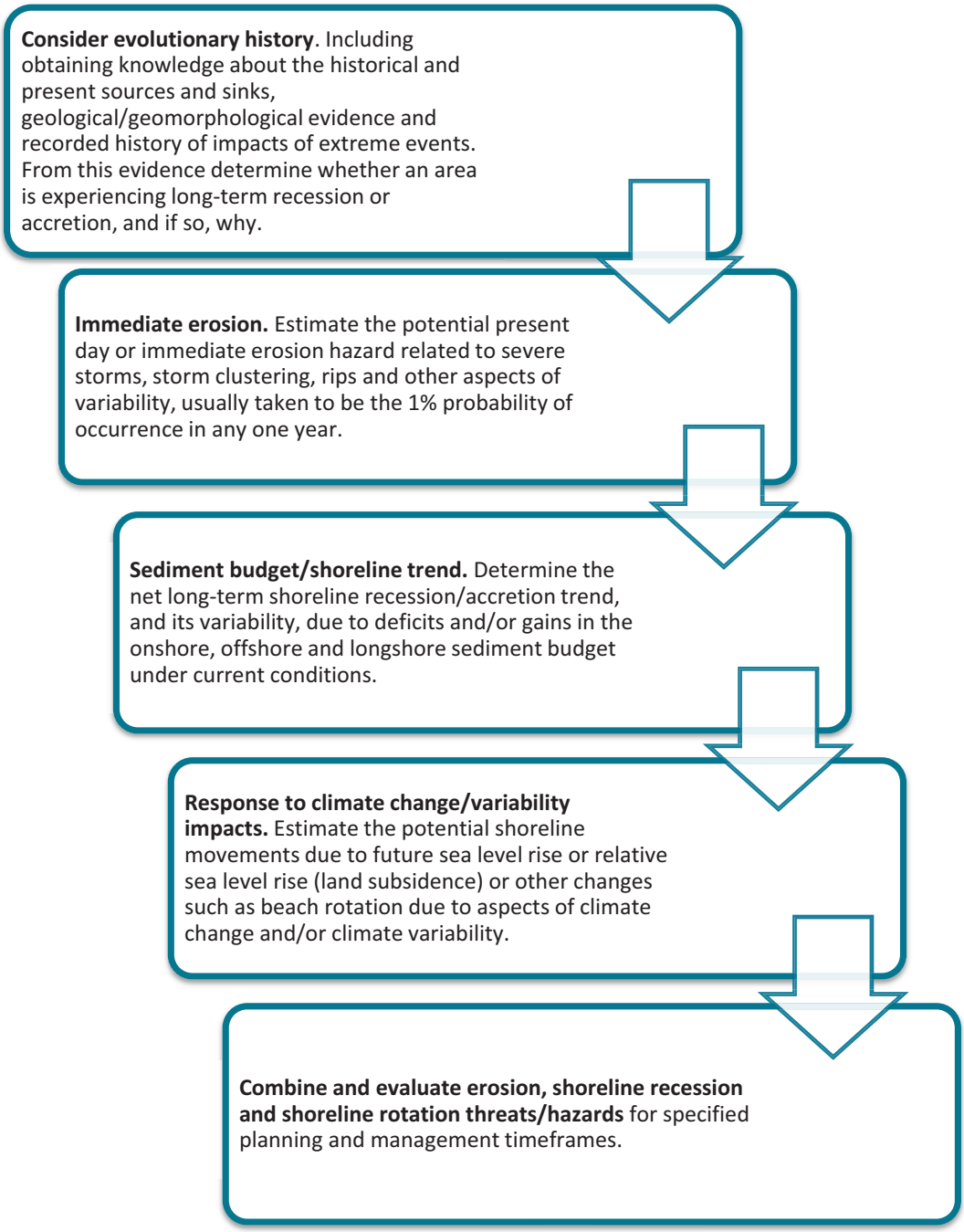

Figure B2.8 Steps in an integrated beach erosion and shoreline recession assessment

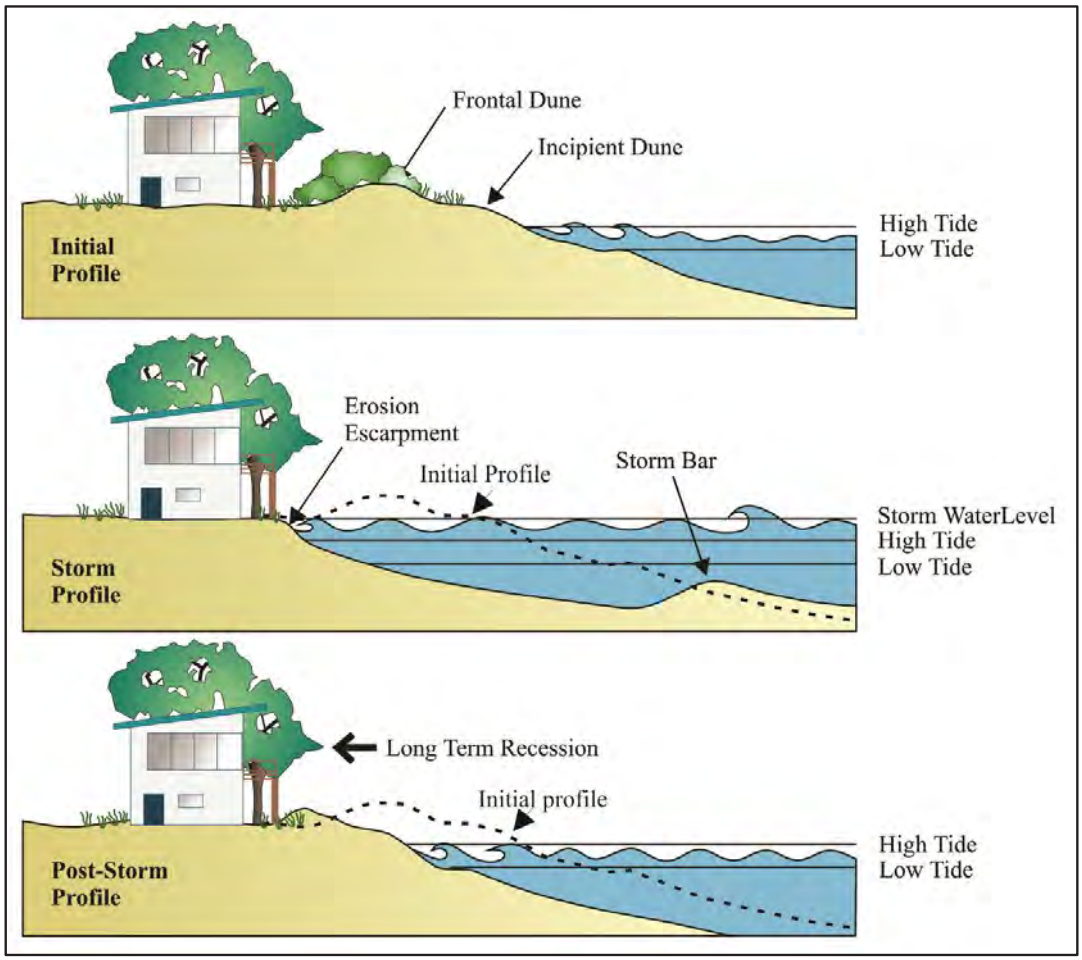

Figure B2.9 Long-term shoreline recession

2.5.3 Coastal lake or watercourse entrance instability

Both natural and trained entrances of estuaries and coastal lakes present a variety of potential hazards and risks. The entrance dynamics and the condition of the entrance also affect flood hazards, water quality and ecological health in the estuary or coastal lake. Refer to **Section 2.6** for further information about the relationship between entrance condition and pressures on the health of coastal waterways.

Many estuary entrances are partially infilled with sand forming highly mobile flood tide deltas, e.g. Lake Macquarie. Entrances are highly dynamic environments with their shape constantly changing in response to processes such as alongshore sediment transport, tidal flows, storms, and catchment flooding.

Figure B2.11 illustrates sediment pathways in an estuary entrance. For trained entrances, the sediment transport patterns are modified, with potential impacts on beach erosion, current velocity and channel stability.

Where an entrance is also in a coastal use area (e.g. used by commercial or recreational vessels, or for swimming or fishing), risk considerations may include public safety and risk to human life. **Table B2.7** (in **Section 2.11**) identifies potential studies of coastal lake and

watercourse entrance instability. The studies may refine the understanding of these processes and quantify the risks related to entrance instability.

Intermittently closed and open lakes and lagoons (ICOLLs) are highly sensitive to catchment runoff and the frequency of entrance opening and closure.

Entrance conditions affect a range of factors such as berm height, water levels, flushing, water quality, salinity and sediment dynamics in coastal lakes and lagoons. High water levels behind a closed entrance may exacerbate the impacts of catchment flooding on:

- residential properties and development on the lake foreshore
- roads, stormwater and sewerage systems
- public access and recreational use for foreshores
- coastal wetlands and floodplains.

Entrance condition also affects ecological processes such as prawn and fish spawning and growth, with important economic implications for local fisheries.

Artificial opening of the entrance of an ICOLL can have significant environmental impacts and may result in dangerous and high velocity flows, and safety risks. The sensitivity of the waterway and potential adverse impacts are important considerations to inform entrance management decisions for ICOLLs.

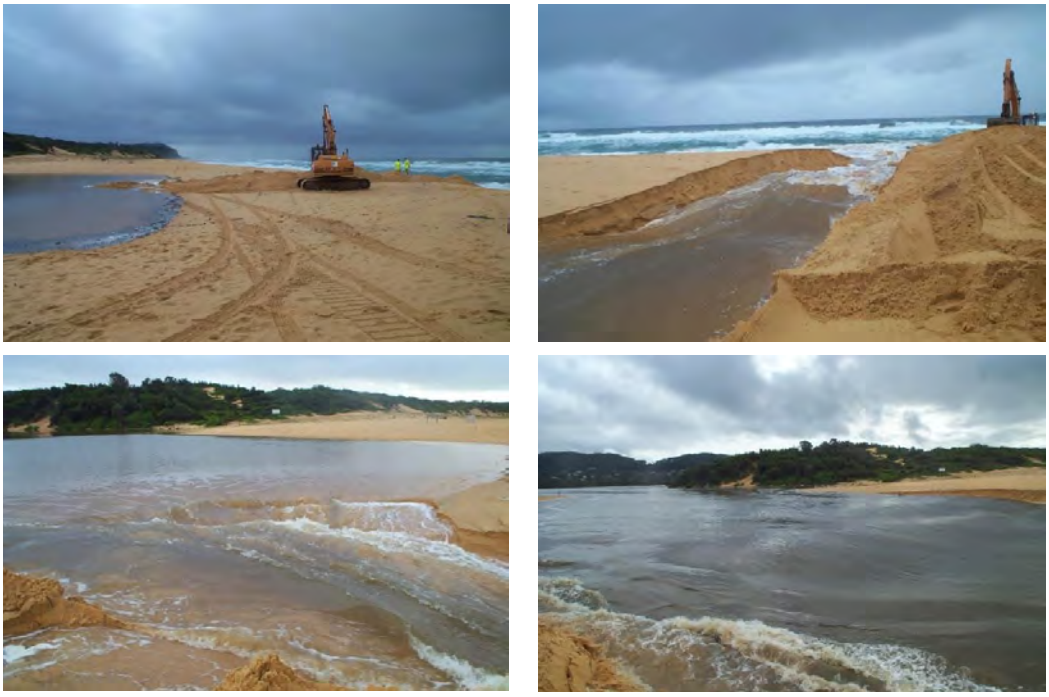

Figure B2.10 Artificial lagoon opening, Wamberal Lagoon, May 2003 (Photo: D Hanslow/OEH)

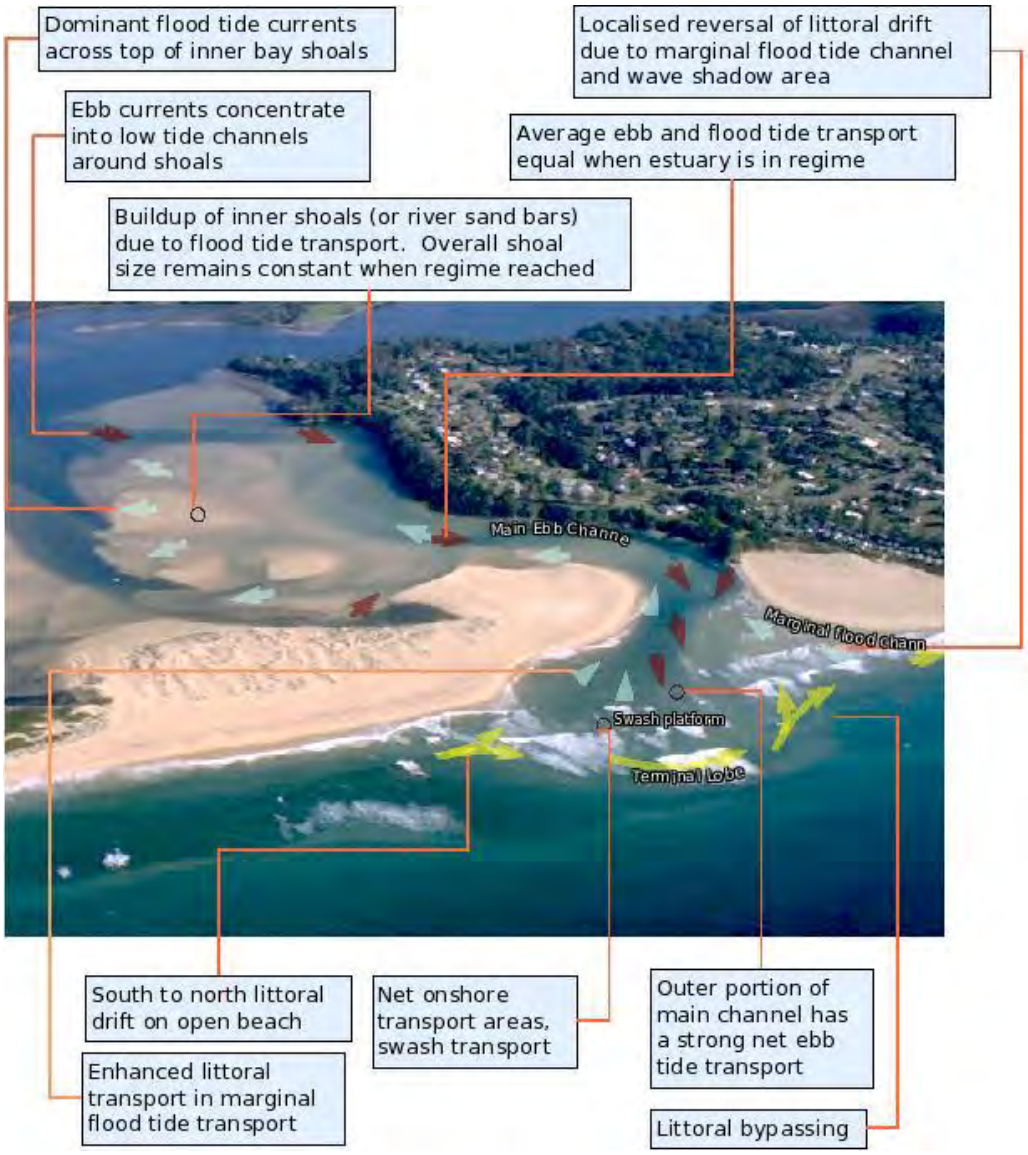

Figure B2.11 Sediment transport pathways at an estuary entrance, Tuross Heads

2.5.4 Coastal inundation

Coastal inundation is the temporary flooding of a portion of land within the coastal zone. It is desirable to distinguish between:

- coastal inundation, which is generally related to storm events (in this section)
- tidal inundation, which is generally related to elevated tidal water levels under average meteorological conditions (see **Section 2.5.5**).

Coastal inundation occurs when a combination of marine and atmospheric processes raises ocean water levels above normal elevations and inundate low-lying areas or overtop dunes, structures and barriers. It is often associated with storms resulting in elevated still water

levels (storm surge), wave setup, wave run-up and over-wash flows. Overtopping and inundation can occur on:

- beaches and coastal dunes
- cliffs and bluffs (in extreme storm conditions)
- seawalls, revetments and entrance training structures.

Storm surge and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. In the longer term, the extent of coastal inundation will be influenced by water levels that are elevated by other processes such as climate change and sea level rise.

Figure B2.12 Wave run-up at Casey's Beach (Photo: G Armstrong/Eurobodalla Shire Council)

Figure B2.13 shows the different components of water level that contribute to temporary coastal inundation.

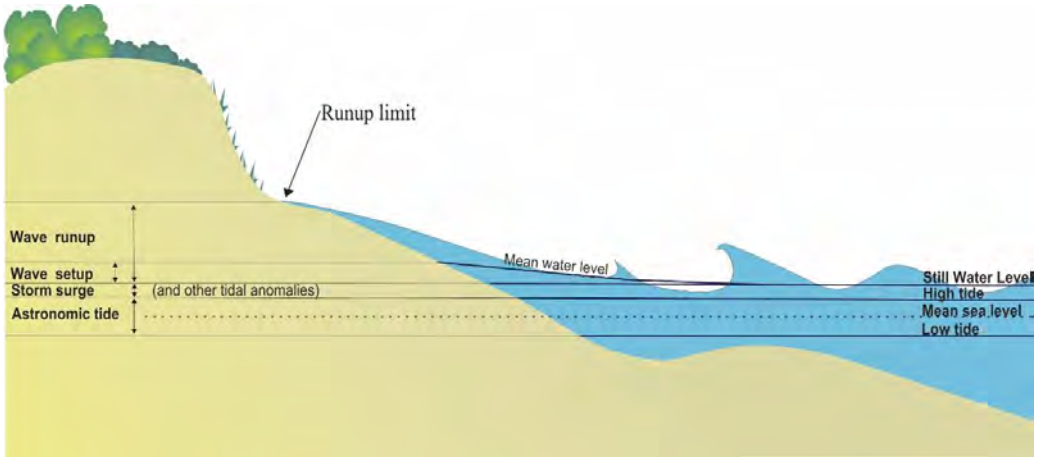

Figure B2.13 Elevated water levels on the open coast

The purpose of a coastal inundation study is to quantify the likelihood of occurrence and the resultant spatial extent, depth and velocity of seawater inundation and the associated risks. High-resolution elevation data is very useful when refining the extent of coastal inundation risks.

Coastal inundation risks may relate to:

- public safety and loss of life due to drowning or impact of debris
- inland propagation of ocean waves, tsunamis, seawater and currents causing damage to property, vehicles, moored vessels, infrastructure and ecosystems
- impacts on both business activity and the financial security of a region
- loss of access to isolated coastal communities
- contamination of soils and groundwater with salt water
- exacerbated coastal erosion.

Table B2.8 (in **Section 2.11**) identifies studies that may be needed to inform decisions about the management of coastal inundation issues.

Coastal inundation and flooding may also occur as the result of a tsunami. Tsunamis result from earthquakes and can pose a risk to coastal assets, public safety and human life. When considering the likelihood and risk associated with tsunamis, the NSW State Tsunami Plan can provide important information for councils and assist in their broader emergency management preparedness.

Figure B2.14 Storm inundation at North Entrance, June 2007 (Photo: Wyong Shire Council)

Figure B2.15 Waves overtopping seawall at Kiama Harbour depositing debris on foreshore, June 2016 (Photo: D Wiecek/OEH)

2.5.5 Tidal inundation

Tidal inundation or nuisance flooding is the inundation of land by tidal action under average meteorological conditions. Tidal inundation may include shorter-term incursion of seawater onto low-lying land during an elevated water level event such as a king tide or more permanent inundation due to land subsidence, changes in tidal range or sea level rise. In some scenarios, the risk associated with tidal inundation may be exacerbated when a king tide coincides with coastal inundation or catchment flooding.

Figure B2.16 Tidal inundation, Marks Point, May 2015 (Photo: D Hanslow/OEH)

Any changes in mean sea level will directly affect the extent and severity of tidal inundation hazards.

Tidal inundation risks may relate to:

- habitability of low-lying coastal land, including public health and maintaining public infrastructure such as stormwater and sewerage systems
- tenure of permanently inundated land
- contamination of soils and groundwater by salt water
- change of ecological character and spatial extent of coastal wetlands
- loss of access and isolation of coastal settlements
- loss of foreshore recreational access and opportunities
- increase in flooding upstream due to increased ocean and estuary tail-water levels.

Studies can assist to determine the likelihood of these hazards over timeframes relevant to management of existing infrastructure and development, as well as for future planning and development of the coast. Timeframes to consider include immediate, 20 years, 50 years,

100 years and beyond, taking into account the potential effects of climate change and sea level rise.

High-resolution elevation data (such as from LiDAR) is important when refining the extent of tidal inundation risks.

Table B2.8 (in **Section 2.11**) identifies studies that may be needed to inform decisions about the management of coastal and tidal inundation issues.

Additional information on these interactions is provided in the *Floodplain Risk Management Guide: Modelling the Interaction of Catchment Flooding and Oceanic Inundation in Coastal Waterways*.

2.5.6 Coastal cliff or slope instability

Geotechnical or slope instability hazard occurs on the headlands and bluffs within and separating coastal sediment compartments. The differing degree of instability often relates to the interaction of weathering and erosion processes on different geological formations and rock types.

For example, interbedded sandstone and mudstone or unconsolidated sandy materials overlying more impervious rock units tend to be susceptible to erosion and instability. Slope instability may also be an issue where there are high erosion escarpments in coastal dunes and beaches.

Geotechnical hazards present risks both to property and to life, such as rock falling from headlands and cliff faces, collapse of unconsolidated materials (such as high dune escarpments), reduced foundation capacity, and the collapse of cliffs under houses and development.

Figure B2.17 Rockfall from coastal cliff, Newcastle, October 2002 (Photo: OEH)

Detailed geotechnical studies may be required when the Stage 1 scoping study indicates complex interactions between geotechnical hazards and coastal assets or public access. **Figure B2.19** provides an overview of processes operating on cliffs and bluffs.

Additional information is provided by the Australian Geomechanics Society 2007. Examples of relevant studies for slope instability issues are included in **Table B2.9** (in **Section 2.11**).

Figure B2.18 Cliff protection works, Bilgola beach (Photo: D Hanslow/OEH)

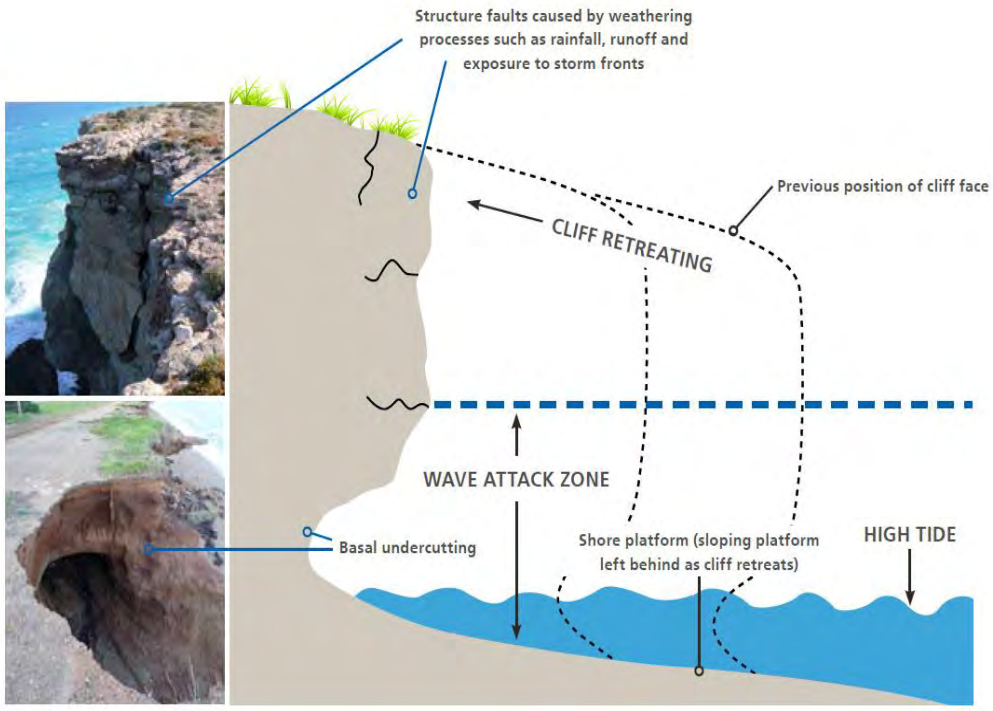

Figure B2.19 Weathering and erosion processes operating on cliffs and bluffs (Source: Coast Protection Board of South Australia)

2.5.7 Erosion and inundation of estuary foreshores caused by the action of waves and catchment floodwaters

Councils may consider the preparation of detailed hydrodynamic and sediment transport studies when Stage 1 identifies that estuary and coastal lake shorelines are actively eroding or accreting.

The impacts of these hazards may include:

- loss of foreshore vegetation and degradation of coastal habitats
- land tenure issues where foreshore property boundaries are ambulatory
- damage to residential or commercial buildings
- damage to public and private infrastructure
- disruption of services and facilities
- loss of public access and public safety issues.

Detailed studies can provide information about the geomorphology and evolution of the foreshore and specific drivers of erosion or accretion, including fluctuating water levels, wind waves, boat wash, tidal and/or wind-induced currents or catchment flooding.

Many foreshores and floodplains are comprised of unconsolidated material that was deposited during the evolution of the estuary. They may not recover from erosion events and ongoing recession or bank erosion is likely to occur.

The erosion of estuary foreshores may also be associated with the long-term evolution of the estuary due to geomorphic processes.

Figure B2.20 Mapping changes to the historic shoreline of Winda Woppa and Jimmy's Beach illustrates the dynamic nature of estuaries (Source: Ana Vila-Concejo/University of Sydney)

Erosion and inundation of estuary foreshores can also be influenced by entrance training works, dredging and entrance management practices that may change tidal ranges, allow the incursion of oceanic waves and change current velocities and sediment dynamics.

The impacts of sedimentary processes on the health and condition of fringing vegetation, such as coastal wetlands, seagrass beds, saltmarsh, mangroves, and riparian communities are important considerations for studies relating to estuary foreshores.

Inundation around estuaries may occur due to coastal or catchment flooding, operating independently or due to a combination of both, derived from the same meteorological event (a coincident event). The interaction of catchment flooding and coastal processes is an important consideration in determining overall flood and inundation risk in coastal waterways.

Examples of the studies that may be relevant to improving understanding of estuary foreshore erosion and inundation are included in **Table B2.10** (in **Section 2.11**). Additional information on catchment flooding is provided in the *Floodplain Development Manual: the management of flood liable land* (2005).

Figure B2.21 Estuary bank erosion, Shoalhaven River (Photo: OEH)

2.5.8 Coastal hazard mapping

The outcomes of coastal hazard studies may include mapping to indicate the spatial extent and impact of the coastal hazard. When preparing hazard mapping it is recommended that accompanying text describes:

- the information and models that have been used to undertake the hazard mapping
- the level of confidence in the hazard mapping.

Hazard mapping is a useful tool for analysing and communicating coastal hazard risk. The hazard mapping may be used to inform the likelihood component of the risk analysis. The risk analysis may require overlaying hazard mapping with spatial information on built and natural assets. Community and stakeholder consultation may also assist in identifying items located in hazard zones that are not mapped in public authority GIS layers such as historical informal landfill sites.

Mapping may also be used to indicate regional scale sediment budgets that drive beach response and shoreline change including sediment sources, sinks and pathways, and connectivity within the sediment compartments.

Hazard mapping may be used to underpin a planning proposal and in defining the coastal vulnerability area.

First-pass (qualitative) assessments of the coastal hazard risk in a scoping study are less complex and may involve the use of available regional scale mapping, application of conceptual and simple numerical models, and expert scientific and engineering judgement. The risk levels determined in a first-pass risk assessment are qualitative.

More sophisticated hazard mapping may be desirable in Stage 2 to refine risk levels, vulnerabilities and opportunities. This may include mapping the potential range of erosion hazard extents using exceedance probabilities.

The exposure of areas to tidal inundation hazard depends on the pathway available to tidal waters. Availability of high-resolution topographic elevation data allows for more accurate mapping of tidal inundation pathways, indicating areas that provide a direct hydraulic connection between coastal waters and low-lying areas.

2.5.9 Risks to life

Many coastal processes and hazards pose a threat to public safety and risk to life for people living on or using the coast.

Quantitative measures of the likelihood of death, injury or illness may be estimated for coastal processes, hazards and threats to the coastal environment. Public safety issues and risks to life may arise from:

- cliff and bluff instability, beach erosion, dune collapse and slumping of foreshores
- waves, run-up and overtopping of rock platforms, structures and natural shorelines
- inundation, waves and currents caused by extreme storm events or tsunamis
- coastal flooding and floating debris
- surge effects associated with coastal inundation
- dangerous surf conditions, rips and collapsing sandbars
- shallow or variable water depths and submerged objects
- dangerous coastal entrance conditions
- poor water quality, pathogens and contaminants
- inappropriately located access tracks, walkways and lookouts
- use of vehicles on beaches, foreshores and waterways
- poorly designed and maintained foreshore structures that result in rocks and debris on beaches and in the surf zone, or material being dislodged and transported landwards towards built assets
- undermined structures or exposure of hazardous objects and contaminated landfill.

Factors which may need to be considered in an analysis of public safety issues and risks to life in the coastal zone include:

- local seasonal variations in population
- community understanding of the risks
- age, health and ethnicity of the population using the coast
- likely exposure to contaminants and pathogens
- likely exposure to very large coastal storm events
- potential for catastrophic failure of cliffs and bluffs or sand dunes
- the use of appropriate design standards and warning signage in hazardous areas
- existing emergency management and disaster relief arrangements.

Table B2.11 (in **Section 2.11**) provides examples of studies which may be useful to enhance understanding of risks to life.

Figure B2.22 Damage to the foreshore at Casey's beach creates risks to public safety (Photo: G Armstrong/Eurobodalla Shire Council)

Figure B2.23 Risks to public safety from coastal erosion, Park Beach, Coffs Harbour (Photo: OEH)

2.6 Studies in coastal environment areas

Detailed studies for coastal environment areas may be considered when there is evidence that the ecosystems are degraded or threatened, current management arrangements are not achieving the management objectives, or where planning or protective measures are required for areas of environmental significance.

Studies undertaken in Stage 2 can help councils to identify where actions may be required to maintain or improve waterway health and support community values and uses of waterways as well as broader objectives such as healthier, more resilient communities and cities.

As catchments are developed and population increases, the volume of stormwater entering waterways increases and carries with it increased loads of nutrients, pollutants and pathogens from both point and diffuse sources.

The health of coastal waterways is influenced by a range of land use planning decisions and management practices, water management, sewage and industrial wastewater treatment and disposal and management of stormwater.

During Stage 2, councils may identify current and potential impacts of land use change on a waterway. This will help identify and evaluate appropriate management responses. Additional information on a risk-based approach for considering waterway health is provided in the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land Use Planning Decisions.

Several of the issues affecting coastal environment areas may also impact on coastal wetlands and littoral rainforests areas. Thus, there may be overlap in the scope of detailed studies for these two management areas in the coastal zone.

Some coastal environment area issues may also overlap with coastal vulnerability areas and coastal use areas (e.g. recreational infrastructure and recreational use of the surf zone, foreshores and waterways).

Studies in Stage 2 may provide information that helps to:

- redefine the extent and boundaries of the coastal environment area
- identify and map current threats to the ecological functions and ecosystem services in the coastal environment areas
- identify which physical and/or ecosystem components may be vulnerable to degradation now and in the future
- understand how coastal hazards, now and in the future, interact with other threats to coastal environment areas, including climate change and sea level rise
- identify the impacts of land-based activities, entrance management, sediments and acid sulfate soils on the health of waterways and aquatic ecosystems
- identify point sources and areas of diffuse source nutrients and pollutants
- identify opportunities to reduce the threats to coastal environments and ecosystems
- identify opportunities to improve resilience through the rehabilitation or improved management of ecosystem components
- prioritise management actions and understand any associated trade-offs in terms of the health of coastal environment areas
- identify appropriate land-use controls such as zoning and management plans for reserves in the coastal environment area.

Table B2.12 (in **Section 2.11**) provides an overview of issues in coastal environment areas, and the types of detailed studies which may be relevant in Stage 2, depending on the location, land-use history and land management practices.

Figure B2.24 Volunteers surveying seabirds, Five Islands Nature Reserve, NSW south coast (Photo: R Morris/OEH)

Figure B2.25 Cliffs and coastline, Malabar Headland National Park (Photo: C Weston/OEH)

Figure B2.26 Bateau Bay picnic area, Wyrrabalong National Park (Photo: J Spencer/OEH)

2.7 Studies in coastal use areas

Studies may be undertaken in coastal use areas when information is required to assist council in making decisions about land-use planning and coastal access and use.

These studies may assist council to:

- protect and enhance the scenic, social and cultural values
- maintain public access, amenity and use of coastal lands and waters, including public recreation spaces and surf zones
- facilitate development that is appropriate to the location and natural scenic setting of the coast, incorporating principles of urban design as consistent as possible with provisions in the State Environmental Planning Policy (Coastal Management) 2017 (CM SEPP) and Coastal Design Guidelines
- facilitate coastal planning that protects cultural and built heritage values and assets
- acknowledge Aboriginal peoples' social, cultural, spiritual, customary and economic use
- recognise the coast as a vital economic zone
- identify and plan for changes in demographic and socioeconomic character
- enhance the social, cultural and economic wellbeing of the community
- ensure the built environment is in keeping with the vision for the area
- provide adequate public open space.

Many councils will, for the urbanised parts of their coast, have a high level of overlap between the coastal use area (used for recreation, residential or commercial development or activities) and the coastal vulnerability and coastal environment areas.

Information about the community living in, accessing and using the coastal use areas is a key input to understanding the risks associated with coastal hazards and threats to coastal values.

Different types of urban development are outlined in the *Coastal Design Guidelines for NSW*.

Table B2.13 (in **Section 2.11**) provides examples of the studies that may be relevant to coastal use areas.

Figure B2.27 Coastal use area, Evans River (Photo: J Lugg/OEH)

2.8 Coastal risk assessment

A detailed risk assessment may be required in Stage 2 if the first-pass risk assessment (Stage 1) identified complex issues, potentially high and unacceptable risks, significant uncertainty or complex management choices.

Unacceptable risks are likely to occur when high-value assets (natural, cultural or built) and critical infrastructure are situated within areas affected by coastal hazards, particularly in the short to medium term.

The risk assessment undertaken in Stage 2 may use the information provided by additional studies to confirm and clarify the nature and significance of coastal risks.

The risk management framework is set out in ISO 31000 (2009). **Figure B1.4** and **Figure B1.6** illustrate the risk management process, and the relationship between the first-pass and detailed risk assessments, respectively.

It is important to identify objectives for the detailed risk assessment considering the outcomes of the first-pass risk assessment and the additional information from Stage 2 studies.

The risk analysis and evaluation may benefit from consultation with relevant stakeholders so that different perspectives are incorporated in the analysis of consequences and likelihood.

Councils may revisit the context for their risk assessment including:

- the areas or issues of interest
- the history of past events and the likelihood of change to type, frequency or intensity of events
- the vulnerability and exposure of the community to coastal issues including changing coastal hazards (refer to **Figure B2.28** and **Section 2.8.1** and **2.8.2**)

- the sensitivity and adaptive capacity of the community (refer to **Sections 2.8.3** and **2.8.4**)
- the timeframes being considered
- the future scenarios that will be considered (refer to **Section 2.8.5**)
- the level of risk that is acceptable to the community
- the criteria to be used to assess the consequence and likelihood inputs to the risk analysis
- the level of certainty needed for decisions about the management of the coast
- how the outcomes of the risk assessment will be used to identify appropriate management responses.

The information from the detailed risk assessment will help identify priority issues for response and appropriate risk treatment management options in Stage 3.

2.8.1 Vulnerability

In the detailed risk assessment, it is important to consider the vulnerability of coastal assets, systems and communities. Vulnerability in a coastal context can be determined by:

- developing an understanding of the exposure and potential impacts of hazards and threats
- assessing the sensitivity of communities, assets and values to potential impacts
- assessing the capacity to respond and adapt – this is also influenced by the environmental, socioeconomic and planning context.

Assets and coastal values that have a high exposure and sensitivity to the impacts of coastal hazards, combined with a low capacity to mitigate the impacts or be modified to adapt, are highly vulnerable. **Figure B2.28** shows schematically how these components of vulnerability interact.

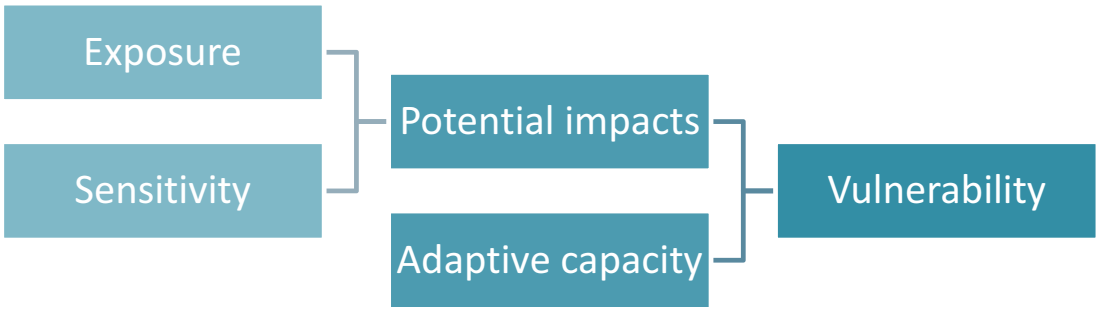

Figure B2.28 Components of vulnerability

2.8.2 Exposure

In a coastal context, exposure relates to the potential for individuals, assets and values to be impacted by a hazard and threats. Assets and values at risk can include residential properties and communities, buildings and structures, public infrastructure assets, as well as environmental assets. It can also refer to social values, economic activity and critical infrastructure networks.

Exposure information combines the location and characteristics of the assets and values at risk. This information is useful for risk analysis and determining the vulnerability that describe how the individuals, assets and values are likely to behave when subjected to natural or human-induced forces.

2.8.3 Sensitivity

In the coastal context, sensitivity relates to the type and extent of change in a coastal system (such as a landform, ecological community or settlement) when it is subject to pressures from coastal hazards or threats.

The studies undertaken in Stage 2 will help councils understand the dynamics of coastal systems (sediment transport, erosion, accretion, recession, inundation and ecological processes) and help determine the sensitivity of the coastal zone to future changes.

If a system or asset is sensitive to hazards and threats, it is likely to be more vulnerable under future climate change scenarios, including sea level rise, temperature and storminess. It is important to consider the sensitivity of the local area to diverse future scenarios.

It is also important to understand how any interdependencies between systems influence sensitivity; for example, when assessing the risks to port infrastructure, the sensitivity of electricity supply, water supply, roads and transport routes may also need to be considered.

2.8.4 Adaptive capacity

In the coastal context, adaptive capacity refers to the capacity of a system (such as a beach and foreshore, or an array of ecological communities), or a community, to respond to risks. Adaptive capacity relates to individuals, communities, organisations and assets.

When assessing vulnerability and risk, adaptive capacity is an important consideration. Adaptive capacity is influenced by factors such as:

- Whether there is space and time to change or move.
- The availability of feasible mitigation measures and technologies that can reduce the risk.
- The ability to adjust behaviour. In the case of human settlements and communities, this is affected by socioeconomic factors that will be identified in Stage 2 studies.
- The availability of resources and willingness/capacity to pay for management actions, also affected by socioeconomic context.

2.8.5 Future scenarios

For the detailed risk assessment, it is appropriate to consider a range of possible future scenarios. These might include future scenarios for climate change (incorporated into the hazard assessment, for example) and future scenarios for population growth, development and use of the coast. Certainty about future scenarios will vary with the timeframe being considered.

To explore a range of possible risk outcomes and appropriate risk treatments it is recommended that a range of scenarios be considered when identifying consequences over immediate to long-term (100 years and beyond) timeframes.

The difference between these scenarios and the choice of the most appropriate scenario for the risk assessment will depend on:

- the design life of the exposed assets
- the socioeconomic importance of the asset or the service it provides to the community; for instance, is critical infrastructure involved?
- the inherent uncertainty over longer timeframes
- the strategic context of decisions being made about land use, for instance, decisions about existing or infill development or extending development into new areas and greenfield sites.

For example, if an asset has a high value and short design life it may be appropriate to focus on worst-case or high-end projections over the short timeframe. Alternatively, when considering a low value or readily adaptable asset, it may be appropriate to consider lower range projections when assessing vulnerability and risk.

When considering future scenarios for critical infrastructure or long-term land use planning decisions, it is appropriate to gain an understanding of the full range of risks over longer timeframes and high range projections.

2.9 Moving on to Stage 3

Stage 2 will assist councils understanding of the complexity of the issues and risks affecting the environmental, social and economic assets and values in each coastal management area.

Councils will have identified opportunities to enhance the environmental, social and economic values of their coastal area and manage current and future risks.

During Stage 3 councils will identify and evaluate management options and actions that can be implemented to reduce vulnerability and risks. These actions will help build the community's resilience and ability to adapt to change. Councils will also determine how progress in risk mitigation will be measured.

The detailed information from Stage 2 will help set the priorities for identifying management actions in Stage 3. Stage 2 will also provide the information needed to determine the level of option evaluation required in Stage 3.

In some circumstances, councils may progress to Stage 3 or to Stage 4. The situations in which councils move from Stage 2 to Stage 3 or Stage 4 are summarised in **Figure B2.29**.

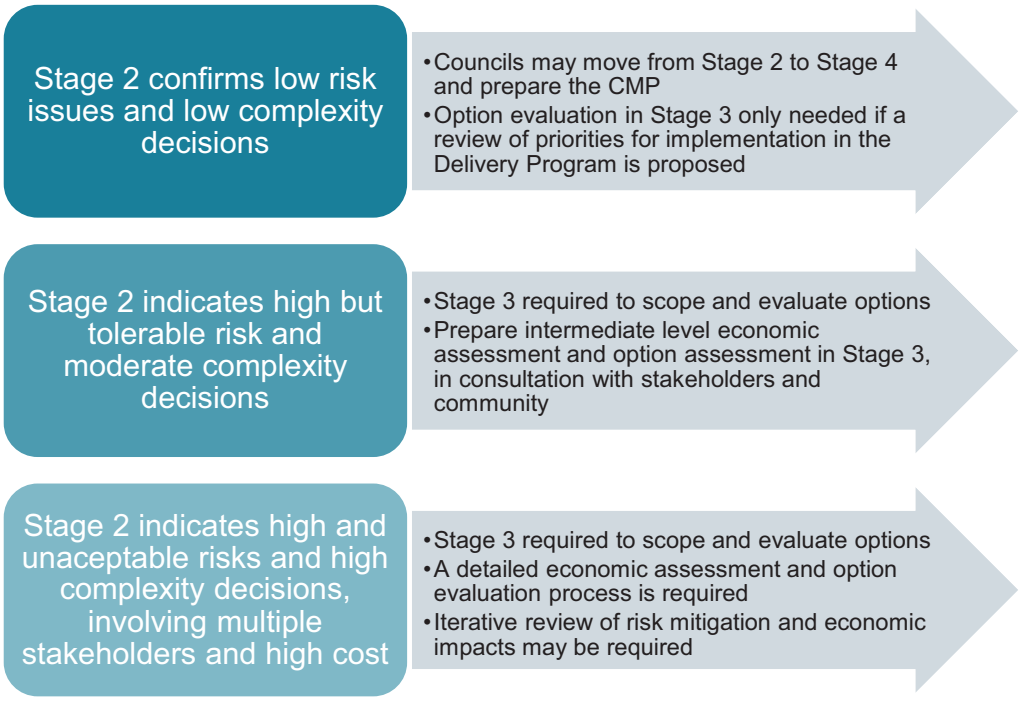

Figure B2.29 Moving on from Stage 2

2.10 Using Stage 2 information to support a planning proposal

In Stage 1 councils may identify that a planning proposal is required to amend the mapping of coastal management areas originally mapped in the CM SEPP. The studies in Stage 2 provide important information to help the planning proposal meet the Gateway requirements.

The planning proposal sets out the justification ('strategic merit') for making or amending a LEP (in this case amending coastal management area originally mapped in the CM SEPP).

If another authority is the planning proposal authority, this information will still be important for council to recommend any changes to relevant planning controls, including maps.

2.11 Compendium of issues relating to potential studies

Table B2.1 Examples of when detailed studies may be desirable

Coastal wetlands and littoral rainforests areas
• There are significant gaps in knowledge about the past, present and future evolution of coastal wetlands and littoral rainforests areas, including factors influencing the condition and resilience of these ecological communities such as the impacts of climate change. • There is evidence that SEPP maps are out-of-date or incorrect. • There have been significant increases in current and future threats to the condition of coastal wetlands or littoral rainforests such as changed drainage, clearing, or sediment or nutrient inputs. • There has been an increase in the vulnerability of coastal wetlands and littoral rainforests to the cumulative impacts of threats to their resilience, functioning, diversity or connectivity. • There are new opportunities to rehabilitate or enhance the wetland or rainforest and/or opportunities to increase community enjoyment of coastal wetland and littoral rainforest. • There is an increased appreciation of ecosystem services that are derived from coastal wetlands and littoral rainforests. Note: Also refer to the coastal environment areas section below.
Coastal vulnerability areas
• The Stage 1 scoping study has indicated that the current risk level is high or extreme and intolerable. • There is a high level of uncertainty about the geomorphic response to coastal processes and hazards. • An extreme event or sequence of events results in new estimates of the hazard extent or severity and it becomes apparent the hazard has been underestimated. • New measurements or modelling tools become available that would significantly reduce the uncertainty around, and/or change, previous risk assessments. • Design features of built assets do not accommodate coastal processes and may increase the consequence of the hazard. • New structures or other developments are likely to be adversely affected by, or adversely affect, coastal processes. • Coastal hazards have the potential to cause loss of life or threaten public safety (e.g. severe wave events, or slope failure, particularly in bluff and cliff areas). • A detailed cost-benefit analysis is likely to be required to evaluate management options. • Significant changes in coastal land use are proposed.

- Significant changes to the social or economic profile of the coastal area have altered the consequence and vulnerability profile, and this would alter the outcomes of the previous risk assessment and potentially result in changes in land use.
- Where a probabilistic coastal hazard assessment is desirable to inform decision-making that will distinguish shorelines that may behave as fast responders to extreme events and climate change drivers and those that may be more resilient to change.
- New scientific information becomes available about coastal processes and drivers, including climate change and sea level rise. This may include new information about the ways in which sandy coastlines will respond to climate change and sea level rise, including the distribution of sand between the nearshore, the beach face and the frontal dune system. Improved understanding of these sediment budget issues will influence the selection of appropriate management responses.

Coastal environment areas

- There are significant gaps in knowledge about the condition or resilience of coastal waterways, headlands, beaches, rock platforms or coastal dunes, so that there is insufficient suitable information available for a quantitative risk analysis.
- There have been significant increases in threats to the resilience of coastal environment areas including the catchments of estuaries, lakes and lagoons.
- There are high levels of uncertainty about the interaction of biophysical processes or the potential impacts of climate change in coastal environment areas.
- The spatial and temporal scale of the existing or predicted impact requires definition; for instance, are the identified impacts acute, short-term, chronic or long-term?
- The cumulative impact of threats to the resilience, functions, ecosystem services, connectivity and diversity provided by a coastal environment area are important.
- There are opportunities to enhance the natural attributes of the coastal environment area such as planting and weeding programs, restoration of tidal circulation or control of fire regimes.

Coastal use areas

- There are significant gaps in knowledge about the Aboriginal, historical and natural heritage of the coast that would impact on management decisions.
- There are gaps in knowledge about the social and economic value of coastal use areas; or there have been significant changes in the way the community uses and values the coast, that impact on future plans for development in the use area.
- There have been significant changes in coastal access, use or public safety.
- There are opportunities to increase public access, usage and/or enjoyment of the coastal environment, including the surf zone.
- There are high levels of dependence of social and economic activity on specific coastal assets; for instance, a consequence may be influenced by the social value of a surf club building which is a hub for community recreation and social activity, or by the economic importance of a trained estuary entrance and safe, reliable navigability to the commercial fishing industry. The relative significance of loss of coast-related social and economic activity when compared with other changes to local and regional development is an important consideration.
- There are proposals to develop buildings that are not in character with existing development or the natural setting, which may adversely impact visual amenity.
- There have been changes in types of buildings, their height and their impact on beach usage due to overshadowing and/or wind funnelling effects.
- There are opportunities to change the developed form and land usage to benefit the wider community's enjoyment of the coast.
- There are plans to increase the population density or develop new urban areas in the coastal zone that require consideration of urban design principles.

Table B2.2 Matters that might be considered when planning Stage 2 studies

- Do ecological or shoreline monitoring studies (e.g. in relation to migratory shorebirds) need to be conducted at specific times of the year or after specific events?
- Do opportunities exist to partner with other councils, public authorities, academic institutions or community organisations to undertake studies and disseminate information?
- Does the project schedule and budget allow sufficient time and resources to complete detailed technical studies, surveys and risk analysis, including time for council to seek advice from public authorities or the NSW Coastal Council?
- How will council define and quantify non-market ecosystem services, community and social values in a detailed cost-benefit analysis or socioeconomic assessment?
- How will council explain the impact of scientific uncertainty to local residents and stakeholders?
- How will council manage diverse technical opinions and controversial general community comment on coastal science and engineering studies?
- How will the outcomes of the proposed studies add value to analysis and decision-making?
- Is relevant data available from councils, public authorities or other sources for assessments at the level of detail required and agreed upon?
- What information does the business community require to encourage ecologically sustainable development that enhances the 'saltwater' economy?
- What planning horizons are most suited to the threat and risk assessment and subsequent decisions, considering the types of development in the local council area (e.g. brownfield, greenfield or infill), the scale of coastal hazards, social/population and environmental change, and the possible need to change local environment plans (LEPs) and/or development control plans (DCPs)?
- Who should be involved in any proposed workshops or working groups? How will these be conducted in a timely, cost-effective, meaningful and manageable manner?
- Will the proposed studies clearly articulate the scope of the threat and risk assessments and the relevance of outcomes to all stakeholders?

Table B2.3 Matters that may be included in a socioeconomic analysis

- Comprehensive socioeconomic information is desirable when a detailed economic assessment (including cost-benefit analysis and distribution analysis) will be prepared in Stage 3, as part of the evaluation of coastal management options.
- General issues which may be considered include:
  - How does the current management of the coast contribute to the social and economic wellbeing of the communities in the local government area?
  - How could future management of the coast contribute to the social and economic wellbeing of communities in the local government area in line with the principles of ecologically sustainable development?
  - Are these social and economic benefits only local in scale, or do they extend to the state scale/significance?
  - Which stakeholders are likely to be directly affected by coastal issues (including residential, recreational and business uses; and government authorities) and potential management responses?
  - What are the social and economic characteristics of relevant community stakeholders?
- **Issues to consider when establishing the social and economic resilience or vulnerability of a coastal community, and in evaluating potential coastal management responses may include:**
  - How many stakeholders/residents/businesses are involved and/or affected?
  - Who uses the coast and how do they use it?
  - What component of local recreational activity is directly attributable to coastal access?
  - For residential property, what is the real estate value of any affected properties?
  - How has the real estate value varied over the last decade and what are the drivers of property price variability?
  - What is the age of the affected landholders?

- How long have they lived at this location?
- What is their income level and what is the category of their employment?
- How far do they travel from home to work?
- Are they permanent residents or absentee/occasional residents and how does the holiday population increase impact on the use of public facilities and infrastructure including access, sewerage, water supply and parking?
- Is income derived from rental of coastal properties during holiday periods or at other times?
- What specific benefits do residents enjoy from their location?
- How would these benefits change with the various management responses?
- To what extent are these benefits sensitive to coastal management decisions?
- For businesses – in what ways is their business dependent on proximity to the coast?
- What is the economic benefit of these coast-dependent businesses (the 'saltwater' economy)?
- What state or local infrastructure has been provided on the coast to support these businesses and associated employment?
- What is the value of this infrastructure and what is its asset life?
- What maintenance or replacement measures for these assets are identified in council's asset management plan?
- To what extent are coast-dependent businesses also dependent on visitors/tourism?
- How many visitors are in the area annually and how seasonal are visitor numbers?
- What is the proportion of day visitors?
- Where do visitors stay and what are the expenditure patterns?
- Is there evidence that local coastal use and/or use of the coast by visitors is dependent on a specific beach locality, or specific access and amenity features?
- How does proximity to the coast affect the recreational preferences of local people?
- What community assets attract people; for instance, natural beaches, beaches with easy parking, beaches with alongshore pathways and lookouts, beaches with modern toilet and shower facilities, beaches with a lifeguard and/or volunteer surf patrol?
- How much of their recreation time do people spend on beaches or foreshore areas?
- What is the membership of local environment or service groups relevant to the coast (e.g. Coastcare, Reserve Management Trusts, and surf clubs)?
- What economic value do these groups add to the local community?

Table B2.4 Potential Stage 2 studies to understand issues and enhance management of coastal wetlands and littoral rainforests areas

Potential issues	Types of studies which may be conducted in Stage 2
General	
Lack of understanding of baseline condition and evolutionary history of coastal wetlands and littoral rainforests.	Consideration may need to be given to whether detailed studies are required to better understand the extent, values and condition of areas mapped in the CM SEPP. Studies may be conducted to determine the evolutionary history of coastal wetlands and littoral rainforests and potential trajectories of extent and condition. This may include the foreseeable impacts of climate change and projected changes in land use.
Social and cultural values	
Inadequate information about the cultural heritage values (including sites, places, resources and landscapes).	Baseline studies or surveys, literature reviews. Collaborative projects with local Aboriginal communities, local historical societies and resident groups.
Impacts on cultural sites or resources in coastal wetlands or littoral rainforests area.	Studies with local Aboriginal communities of opportunities to restore cultural values.
Impacts on historic heritage values of coastal wetlands or littoral rainforests.	Studies of historic land use and features in and around coastal wetlands and littoral rainforests and opportunities to enhance heritage value and education.
Vegetation, biodiversity and ecological integrity	
Invasive plant and animal species and pathogens.	Studies of the distribution and rates of expansion of invasive species in littoral rainforests, and actions required.
Inappropriate fire regimes.	Studies of the recovery of coastal wetlands and littoral rainforests after wildfire events. Studies of different fire treatments around urban areas.
Clearing and fragmentation of habitats, including urban expansion and edge effects; impacts of urban areas and agricultural uses on coastal wetland margins.	Studies of potential connectivity links across cleared areas of wetland or littoral rainforest and links between these habitats and other coastal environment areas. Studies and trials of managing urban and agricultural impacts on coastal wetlands.
Inappropriate plant, animal or firewood collection in coastal wetlands or littoral rainforests.	Studies of habitat loss associated with removal of logs, hollow trees, etc. and studies of options to address these issues.
Tracks and trails used by pedestrians, bicycles and off-road vehicles.	Studies of the impact of access arrangements on biodiversity and habitat extent and condition. Feasibility studies for alternative routes and opportunities for community enjoyment of coastal wetlands and littoral rainforests without adversely impacting on them.
Foreshore erosion, reclamation or dredging.	Studies to understand changing habitats for protected species such as migratory waders and opportunities to restore areas that have been subjected to dredging or siltation due to past catchment activities.
Inappropriate land use.	Studies on the social value of retaining or returning natural coastal habitats from existing use, particularly unproductive agricultural use, such as many areas behind tidal flood infrastructure. Studies of the impacts of grazing and other agricultural activities.
Hydrology	
Changing hydrology – through groundwater or drainage modification or other variations in water levels.	Investigation of impact of drying on wetland habitats, including loss of peat soils and degradation of groundwater-dependent ecosystems.

Potential issues	Types of studies which may be conducted in Stage 2
	Impact of changed tidal regime, drainage works or changes in stormwater quality and quantity.
Structures such as levees, seawalls and floodgates that constrain the area, function and migration of wetland communities.	Studies to better understand the significance of the changing balance between saltmarsh and mangrove communities, due to various structures and processes. Studies to understand the interactions between freshwater and saline coastal wetlands. Studies to investigate the impact of structures on fish passage and habitat migration. Studies to investigate the opportunities for offsets to address past anthropogenic disturbances of the natural system. Studies to understand the impact of not maintaining floodgates that were designed to prevent the incursion of tidal or saline waters.
Persistent inundation of intermittently or tidally inundated coastal wetlands, such as may occur with sea level rise or changes to tidal levels associated with entrance management.	Studies to identify potential changes in community structure, habitat extent or ecosystem services when inundation patterns are modified due to subsidence, entrance dredging or the impacts of climate change, including increased frequency of high tide inundation.
Contraction of saltmarsh areas and the ability for migration of wetland communities.	Studies to better plan for the retreat and migration of coastal wetland systems (e.g. saltmarsh) on low-lying shorelines subject to increasing inundation due to the impacts of climate change.
Water quality	
Catchment runoff or poor stormwater quality, including: • sediment load in water discharged into the areas of interest • nutrient levels or organic load from existing and new development areas (including residential, agricultural, industrial and wastewater treatment) • litter carried in stormwater • other contaminants.	Detailed catchment studies to identify vulnerable areas and predict sediment and nutrient loads with changing land use especially for catchments listed in Schedule 1 of the CM SEPP. Studies to identify sources and options for sediment and nutrient control. Studies of actual or modelled catchment loads of nutrients to identify vulnerable catchments. Studies of the impact of changes in land use zoning or land management measures on export of sediments and nutrients from vulnerable catchments. Studies of the sources and impacts of litter and other contaminants.
Acidic or low dissolved oxygen (DO) events, such as those linked to discharges from exposed or oxidised acid sulfate soils or flooding.	Monitoring of water quality in vulnerable waterways in the marine estate. Studies of discharges from high-risk acid sulfate soils (see Acid Sulfate Soils Assessment Guidelines for further issues). Studies of low DO events and fish kills in wetlands. Opportunities to contain and/or remediate areas adversely impacted. Options for source management.
Waste dumping, including toxic waste.	Monitoring of high-risk sites; studies of the distribution of contaminants in groundwater or surface waters. Studies to identify options to raise awareness of and enforce compliance and to identify opportunities to remediate affected areas.
Changes to salinity and/or the salinity regime associated with entrance management works, dredging, floodgate management, increased freshwater extraction, controls on catchment inflows or climate change.	Studies to identify potential changes to community structure and diversity as conditions favour species with greater or lesser salinity tolerances.

Table B2.5 Potential Stage 2 studies of beach erosion and shoreline recession

Potential issues	Types of studies which may be conducted in Stage 2
Beach erosion	
Evolutionary history and geomorphic context of the coast is poorly understood, especially the nature of offshore sediment distribution.	Studies to refine understanding of how coastal landforms evolve, and how sediment compartment boundaries and the interaction of sediment sources and sinks changes over time.
Existing or proposed coastal development and infrastructure are located within the areas exposed to beach erosion.	Studies of the variability of oceanic processes, including both spatial and temporal dimensions. Councils may access long-term datasets of wind, rainfall, waves, tides and currents wherever possible and determine whether semi-quantitative or full statistical hazard and risk analysis is appropriate. Studies to better define the short-term beach variability associated with storm clusters, rips and beach rotation within the beach fluctuation zone as defined in the CM Act. Studies of the effect of short to medium-term cyclic processes which may drive episodic beach erosion, including: • analysis of reliable long-term records of storm magnitude and frequency as it relates to the coastal region, which may include several local councils and national parks • reviewing the interactions of storm frequency and intensity with the medium and longer-term drivers of water level, beach erosion and beach orientation, for example, the Interdecadal Pacific Oscillation (IPO). Identify opportunities to mitigate risk through modification of the likelihood and consequences associated with coastal hazards.
Existing or past development (e.g. past mineral sand mining and underground mining) and coastal structures, including entrance training walls and seawalls, are affecting coastal processes and coastal erosion events.	Studies to investigate the impact of these structures and uses on sediment budgets, including how the effects of the structures interact with waves, currents, storms, and cyclic drivers of water levels and coastal processes. It is important to consider the effects of relative sea level changes that may be occurring, such as those associated with subsidence. Historical mining records, including subsidence data and geological evaluations of river delta areas, may be helpful. Identify opportunities to offset the impacts that are a legacy of past practices.
Inadequate information about sediment budgets in the short term.	The development of a conceptual model of the sediment budget including sources and sinks for sediment gain or loss. Where possible, the variability in beach fluctuation zone, volume and profile change can be quantified, taking into consideration factors like storms, storm clusters, rips, beach rotation, headland bypassing and entrance dynamics, as well as losses and gains associated with: • onshore sand supply • sand lost offshore • longshore transport • sand losses or gains to tidal inlets • biogenic sediment production • sand lost to backbarrier (over-wash) • sand lost to dunes (aeolian).
Uncertainty about the likelihood (probability) and consequences of a coastal hazard occurring at timeframes relevant to the management of both existing and future planning and development of the NSW coast.	Appropriate methods to determine the uncertainty depend on the level of risks, the level of uncertainty and the availability of suitable data. Methods for describing and quantifying the likelihood component of risks associated with coastal hazards include: • semi-quantitative – assess components of the sediment budget using existing data, studies based on photogrammetry and modelling and expert judgement to inform decisions

Potential issues	Types of studies which may be conducted in Stage 2
	• statistical probability analysis.
Shoreline recession	
The effect of coastal structures and evolutionary history on longer-term coastal sediment budget processes and on coastal responses to changes associated with climate change, including sea level rise, is not sufficiently well understood to enable decision-making.	As for coastal erosion, important considerations will include coastal geomorphic structure and evolution, including responses of the coast to previous climate change, and the effect of coastal structures on processes such as sediment bypassing around headlands, for different sea level scenarios and wave regimes.
Existing development and infrastructure are located within the area exposed to coastal hazards when long-term factors related to sediment budget, climate change and sea level rise are considered. There is potential for future development to be in areas exposed to coastal hazards.	Important considerations include other factors which influence coastal processes and the morphology of the sandy coast, operating at various interacting time scales. Shoreline recession studies seek to develop a conceptual model of the sediment budget including sources and sinks for sediment gain or loss in the long term and how processes are expected to change with sea level rise and other aspects of climate change (see below). Identify opportunities to reduce the vulnerability of existing or proposed development, including relocation of infrastructure at the end of its economic/design life.
Uncertainty about other coastal responses to the effects of longer-term changes in coastal process drivers, including climate change and relative sea level rise.	Short to long-term water level anomalies and trends considered when defining the degree to which shorelines are ambulatory or essentially oscillate around a mean position. Examples include: • Sea level variation components including extreme sea level events and sea level anomalies (such as coastal trapped waves), medium-term (approximately decadal) cyclic variations in coastal drivers and responses such as El Niño/La Niña and beach rotation processes. • The response of the coastal system to long-term changes to sea level and other climate drivers, using best available information about rates of change. This may include studies of the behaviour of coastal foredunes in areas with different sediment budgets and different exposure to over-wash and/or alongshore sediment transport processes. • Relative sea level changes that can result from land subsidence, particularly in coastal areas where underground mining has occurred, or where development has taken place/will take place on areas that were river deltas. • The morphodynamic interaction of coastal processes and landform change which can affect heights of storm surges and tidal levels at the longer timeframes. • Tsunami exposure.
Integration of multi-scale shoreline evolution factors to predict shoreline recession.	Studies to collect detailed geomorphic information, including the sediment and geometry of the beach and shoreline. The studies assist to integrate the effects of coastal structure, nearshore and inner-shelf bathymetry, sediment availability, sand barrier type, inlet sedimentation and contemporary coastal processes. Mechanisms which may be considered in the analysis include: • the interaction of storm events and rising sea level • how a landward and upward shift of the coastal profile could occur (e.g. beach erosion and offshore deposition)

Potential issues	Types of studies which may be conducted in Stage 2
	• the extent to which dune or flood tidal delta volumes can accommodate sediment loss from the beach due to rising sea level • the consideration of the slope of the nearshore profile and the evolution of sediment compartments • the potential for landward and upward back-stepping of an entire barrier, due to barrier over-wash and tidal inlet deposition • the impact of headland emergence on coastal processes as sea levels rise. The application of statistical simulation frameworks such as Monte Carlo analysis may be necessary when projecting future sediment budget processes in geomorphically complex settings. Simple models of coastal change, such as the Bruun Rule may not be appropriate in these contexts.

Table B2.6 Potential Stage 2 studies of coastal lake and watercourse entrance instability

Potential issues	Types of studies which may be conducted in Stage 2
Poor understanding of the evolution of barriers, entrances and flood tide deltas. Historical studies have demonstrated the dynamic nature of shoreline deposits adjacent to flood tide deltas making these localities some of the most vulnerable to change on the coast of New South Wales.	Review previous historical changes to the position of shorelines and inundation events on shoreline deposits that are marginal to flood tide deltas.
Poor understanding of the role of tidal deltas in the coastal sediment budget and potential consideration of use of flood tide delta sediments for beach nourishment. Removal of sediment from an entrance deposit is likely to stimulate localised beach erosion as waves and currents entrain and transport sand from the beach back into the entrance, to restore the previous 'equilibrium' between the entrance and the beach/surf zone.	Studies to quantify the interrelationship of sediment deposits in estuary entrances and sediments on the adjacent beaches and nearshore areas.
Poor understanding of the impacts of climate change and sea level rise on entrance dynamics. It is likely that as sea level rises, the flood tide deltas of estuaries will store sand from adjacent beaches and the nearshore. In the medium to long-term, estuary flood tide delta deposition may be an important sediment sink for coastal compartments.	Studies to identify the entrance response to climate change and sea level rise. Studies to identify changes to entrance hydrodynamics and sediment transport as a result of the impacts of climate change and sea level rise.
Inadequate information about coastal lake or watercourse entrance instability and the effects of entrance training on sediment budgets. The estuary flood tide delta may become a more permanent sink in	Studies to determine the interaction between fluvial, tidal and wave processes, which determines the morphology and entrance condition and the balance between open, closed or transitional entrance conditions.

Potential issues	Types of studies which may be conducted in Stage 2
circumstances such as the creation or reinforcing of an artificial opening to the estuary and/or dredging of the estuary mouth. This creates additional accommodation space and sediment transport drivers, encouraging persistent sand accumulation inside the estuary (see Nielsen and Gordon 2015).	
Limited understanding of the behaviour of ICOLL entrances and how different management intervention affects entrance processes and other coastal hazards within the estuary or lake.	Studies to determine the factors influencing the intermittent opening behaviour of ICOLLs and the considerable variation in frequency and duration of opening between systems. Studies to determine the impact of a closed entrance on water levels in the lake or lagoon and related inundation of low-lying foreshore areas. Studies to determine the impact of forced opening of entrances on the efficiency of entrance scour and the duration of opening. Studies of the impact of entrance opening and closing on the safety and accessibility of the entrance area for swimmers, impacts on boating access, water quality and fishery productivity. Identify opportunities to modify entrance management practices.
Impacts on water quality, hydrodynamics and ecology of coastal lakes.	Studies to determine the relationship between entrance processes and the water quality and ecology of coastal lakes. Studies to quantify the impact of trained entrances on the circulation, flushing and tidal range of coastal lake systems. Identify opportunities to improve water quality and ecosystem health. These matters are also relevant to studies for coastal environment areas.

Table B2.7 Potential Stage 2 studies of coastal and tidal inundation

Potential issues	Types of studies which may be conducted in Stage 2
Inadequate information about the risk of coastal inundation associated with storm surge, extreme waves and consequent over-wash impacts.	Detailed studies of storm surge and extreme wave processes. Studies to determine the potential impacts of climate change on coastal inundation.
Inadequate information about the risk of wave run-up and overtopping of dunes and barriers.	Detailed studies of wave run-up and overtopping processes. Detailed studies of beach slope and dune heights (use of coastal LiDAR).
Vulnerable assets and infrastructure.	Detailed studies to better understand impact thresholds and how existing vulnerability of coastal development can be managed to avoid an increase in vulnerability and risk. These studies may relate to residential and commercial development, roads, power, telecommunications, water supply, stormwater systems or sewage infrastructure. Identify potential opportunities to reduce the vulnerability of assets and infrastructure and/or opportunities to relocate over time as infrastructure requires replacement or upgrade.
Inadequate information about the potential risks associated with tidal inundation.	Studies to determine the interactions between different coastal processes and forces that can combine to influence the level of inundation. Determine the uncertainties associated with the modelling methodologies, data and information used for inundation assessments. Studies to determine vulnerable assets and infrastructure, including private assets and public assets and infrastructure such as sewage lines and pump stations, parks and pathways, low wharves and jetties. Studies to quantify the interaction of catchment flooding and coastal processes.
Poor understanding of the impacts of climate change on coastal and tidal inundation.	Studies to investigate the potential effects of climate change on tidal inundation processes and how they influence inundation frequency and spatial extents.
Poor understanding of flow pathways, needed to inform management priorities.	Studies to determine the processes involved in inundation of low-lying areas, in particular flow pathways, the storage capacity of an area in relation to the volume and frequency of flows, and the drainage patterns of an area. Conceptual models may be used to provide a representation of the features, processes and management issues for particular areas. They can help to understand the source of the inundation, the pathways to low-lying areas, and the spatial extent of the areas being inundated and in turn the potential consequences.
Poor understanding of the interaction of catchment flooding and coastal processes, needed to inform risk analysis and management priorities.	Hydrodynamic studies to investigate the interaction between catchment flooding and coastal processes.
Potential impacts on groundwater quality, with risks to ecosystems, agriculture and drinking water supplies.	Studies of groundwater quality with different seawater inundation regimes, including the effects of climate change and relative sea level increases. This information may be needed for cost-benefit analysis if important community services and values are affected. Studies of the impact on groundwater-dependent ecosystems. Identify opportunities to reduce the potential impacts on groundwater systems.

Table B2.8 Potential Stage 2 studies of coastal cliff or slope instability

Potential issues	Types of studies which may be conducted in Stage 2
Inadequate information about the potential risks associated with coastal cliff or slope instability in association with geological structures and different rock types.	Studies to determine the factors influencing cliff or slope instability. Studies to determine the location of vulnerable assets and infrastructure. Identify opportunities to reduce the risks associated with coastal cliff or slope instability.
Insufficient information about the interaction of slope instability issues with unconsolidated materials and rock.	Studies of the evolution of beaches and cliffs, including the lithology, stratigraphy and structural geology of coastal cliffs, the stratigraphy of the back-beach area and the extent of bedrock.
Insufficient information on foundation conditions for buildings behind beaches in areas that may be affected by reduced foundation capacity.	Studies to determine the zone of reduced foundation capacity as outlined.
Poor understanding of the key drivers of slope instability.	Studies of the ways in which development on cliffs has altered natural drainage patterns and concentrated surface and groundwater flows. Studies of the impact of climate change and sea level rise on the weathering and erosion (particularly undercutting) of coastal cliffs and bluffs.
Public safety issues.	Studies to investigate risk to life associated with public use of cliffs, headlands, rock platforms, beaches below cliffs and erosion escarpments on beaches. This may include design and location of pathways, lookout platforms and other structures. Identify opportunities to reduce public safety issues and raise awareness of the risks.

Table B2.1 Potential Stage 2 studies of coastal estuary foreshore erosion and inundation

Potential issues	Types of studies which may be conducted in Stage 2
Inadequate information about the interaction of processes causing erosion and inundation of estuary foreshores.	Studies to determine the nature and composition of estuary foreshores. Studies of the interaction of waves associated with local wind waves related to estuary or lake fetch, incursion of ocean waves, seiching and recreational boating. Studies of the interaction of estuary flooding – from the catchment or from oceanic processes and wave processes.
Poor understanding of the consequences of foreshore erosion and inundation, now and in the future.	Studies of the impact of foreshore erosion and inundation on different types of development and associated infrastructure and on uses in different land tenures. This may include private land and public or recreational land and structures such as boat ramps. Identify opportunities to reduce the impacts of foreshore erosion. Identify actions required to mitigate impacts of foreshore inundation.
Potential conflicts about future land use and land management in foreshore areas.	Studies of long-term changes in rates of estuary foreshore erosion and inundation, as they impact on public and private land and on recreational access, amenity and use.

Table B2.10 Potential Stage 2 studies of risks to life

Potential issues	Types of studies which may be conducted in Stage 2
Inadequate information about the potential risks to life due to coastal processes, or location of infrastructure such as pathways.	Studies to determine if hazards and threats are posing a risk to public safety and whether public pathways are located a safe distance from cliffs and bluffs (both top and bottom). Studies to determine the estimated timeframe before the hazard poses a risk to public safety. Studies to determine community awareness of the risks and the necessity for and appropriateness of signage, at the time of coastal emergency events and generally. Studies of the design of existing structures which may be impacted by coastal processes, including entrance training walls (overtopping by waves), and viewing platforms. Identify opportunities to raise awareness and reduce the risks to life due to coastal processes.
Inadequate information about other risks to life, such as contaminants and pathogens.	Studies of historical land and waterway use, including groundwater (see also coastal use areas). Studies of ecological pathways for contamination (such as in oysters, fish and prawns) – see also coastal environment areas. Identify opportunities to reduce the risk of contaminants and pathogens.

Table B2.2 Potential issues and investigations in coastal environment areas

Potential issues	Types of studies which may be conducted in Stage 2
Impacts of future changes in land uses.	An effects-based assessment can be used to quantify how the land use activity will change the health of the waterway. A typical effects-based assessment: • determines whether the current health of a waterway is supporting the waterway objective(s) • identifies the level of protection required • quantifies the stressor(s) arising from the land-use activity • quantifies the sensitivity of the waterway to the stressor(s) • quantifies the extent to which the stressor(s) affects the health of the waterway • quantifies the effectiveness of the management responses in protecting, maintaining and/or improving the health of the waterway. Additional information on a risk-based approach for considering waterway health is provided in the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions.
Location and management of discharge points for sewer, stormwater and other sources of pollution from drainage systems discharging into the marine estate.	Map locations of stormwater discharge points with patterns of sensitive ecological variables. Water quality studies around discharge points from sewage treatment plants (STPs), to ocean, estuary or groundwater, and stormwater discharge points. Identify opportunities to offset any adverse impacts or provide alternative options for management of stormwater or outfall discharges. Evidence of bioaccumulation of contaminants carried in discharges. Assess possible sources of diffuse pollution that may adversely affect the marine estate.
Invasive plant and animal species.	Study species present in coastal environment areas and their distribution. Opportunities to address the adverse impacts of invasive species.

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Potential issues	Types of studies which may be conducted in Stage 2
Conflicts between recreational use and conservation values of beaches and coastal waterways in the marine estate.	Studies of beach and waterway usage such as vehicles on beaches used for passive recreation, motorised vessels in bathing areas and bait/shellfish harvesting. Identify opportunities and/or actions to overcome conflicts.
Dune instability.	The behaviour of coastal dunes when they are destabilised and transgress landward. Reasons for destabilisation may include storms, clearing and dissection of the frontal dunes, fire, sand mining, grazing, extraction or heavy recreational use. Climate change and sea level rise may also impact on the morphology and sediment budget of frontal dune systems. Need for controlled access, education and signage. Willingness of the community to become involved in dune management activities. Community values and objectives for the management of frontal dune systems and dune vegetation may have a strong influence on the management responses that are acceptable.
Urban expansion and edge effects.	Studies of ecological connectivity, water quality in the marine estate, sources of invasive species and recreation demand. Consider both ecological and community use studies; link also to studies for coastal vulnerability areas. Studies may address matters such as: • foreshore and headland management impacts such as filling, mowing, clearing, landscaping or fire regimes • impacts of recreational access – terrestrial and aquatic, e.g. moorings, jetties, ramps, marinas, pathways (especially informal tracks), steps and ramps • impact of invasive species (plant and animal), terrestrial and aquatic • impact of increasing recreational pressure on sensitive coastal habitats, including beaches, dunes, coastal headlands and near urban coastal bushland • opportunities to provide environmentally sensitive, controlled access to environment areas so that the community can enjoy the amenity and develop a greater sense of 'ownership' of the natural assets of their area. See also coastal wetlands and littoral rainforests.
Changing groundwater levels.	Studies of causes of lowering or rising groundwater. Impact on coastal groundwater-dependent ecosystems and on ecological communities that are sensitive to waterlogging, or drying. May also affect coastal infrastructure function (e.g. infiltration into sewerage and drainage systems) and coastal hazards (slope stability). Identify opportunities to manage groundwater levels to offset past adverse impacts and to enhance environmental values of the area.
Foreshore erosion, reclamation or dredging.	Hydrodynamic studies and foreshore erosion studies of estuaries and coastal lakes and lagoons. Studies of foreshore and nearshore habitat. The impact on habitat continuity and quality of shoreline protection works (open coast or estuaries), including seawalls, levees, and bank stabilisation with plantings. The impact and effectiveness of various 'natural' foreshore management techniques on eroding or persistently inundated estuary shorelines. Opportunities to use dredging to offset shoreline erosion and improve water exchange. Community use studies.

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Potential issues	Types of studies which may be conducted in Stage 2
Sediment load and/or deposition.	Sources, amount and character of sediment load and sediment redistribution in aquatic systems. Impacts such as smothering of seagrass and other habitats. Opportunities to redress past inflow deposits and reduce current sediment loads.
Floodplain drainage and levees.	Impacts of barriers to fish passage. Changes to drainage and inundation. Opportunities to offset adverse impacts that are a legacy of past practices.
Acidification (coastal acid sulfate soils).	Studies of the impact of artificial drainage (and water extraction) and floodgate systems, including impacts on groundwater levels, the oxidation of acid sulfate soils and discharges of low pH waters from floodplain drainage systems. Studies of the impact of low pH discharges and other acid sulfate soils impacts on aquatic habitats, fish populations and waterway use. Opportunities to redress past actions that have activated acid release from the soils.
Inappropriate access arrangements, such as moorings over seagrass endangered ecological communities (EECs).	Studies of changes to seagrass health and distribution in areas with boat moorings. Trials of different mooring systems. Waterway usage studies.
Persistent inundation.	Studies of the likelihood of intermittent and permanent inundation at different timeframes. Opportunities for natural systems to migrate to higher ground.
Water quality degradation including excessive nutrient loads and low DO events.	Studies of point and diffuse nutrient sources and discharges that affect the health of ecological communities, including links to catchment land use. Studies of algal blooms and nutrient cycling processes. Studies of organic load entering coastal waterways in the marine estate, directly from catchment runoff and indirectly from excessive growth and dieback of algae and other coastal lake or estuary vegetation. Conditions in which low DO occurs, including entrance conditions and catchment inflows. Studies of fish kills. Opportunities to offset the impact of catchment development through greater flushing as a result of, for example, extended entrance openings and/or reducing the hydraulic friction in channels.
Litter such as plastics, microplastics and fishing line.	Studies of sources of litter (e.g. in stormwater) and impacts on coastal waterways. Community use studies. Identify types of gross pollution interception devices that are suitable for the catchment.
Heavy metal contamination and other contaminants.	Studies of the sources, distribution and impact of toxic contaminants that affect the health of ecological communities or bio-accumulate and impact on the use of estuaries and lakes as fisheries or for recreation. Identify policies and practices required for source control.
Changed water level and salinity regimes due to entrance management to overcome water quality and/or flooding issues.	Studies of estuary and coastal lake hydrodynamic processes. Studies of waterway usage, and usage potential. See also coastal wetlands and littoral rainforests areas.

Potential issues	Types of studies which may be conducted in Stage 2
Loss of value of coastal environment areas, linked to impacts on capacity to provide ecosystem services.	Studies of the condition and value of coastal ecosystems at the local to regional scale, including consideration of environmental ecosystem services (such as clean water, recycling of organic material) and socioeconomic services such as recreational values, fishery values and aesthetics. This information will be a valuable input to the assessment of costs and benefits of major structural protection works or planned retreat strategies.
Opportunities to better define the boundaries of the coastal environment area.	Studies to identify additional areas that may be included as coastal environment areas and thus will require new protective measures such as land use controls.
Potential impacts of climate change.	Studies of the resilience and adaptive capacity of coastal ecosystems to increasing water levels and inundation of low-lying areas and ecosystems subject to climate change stress; for example, rock platforms, dunes, seagrasses, coastal headland heath vegetation and coastal floodplains. Studies to identify areas where habitat migration may occur to accommodate sea level rise and planning to protect those areas. Studies of other potential impacts of climate change on coastal environment areas including increased temperatures, changes in wind and waves, changes in turbidity and foreshore erosion, increased sediment loads, changes in salinity, changes in freshwater quality, quantity and timing of flows.

Table B2.3 Potential issues and investigations in coastal use areas

Potential issues	Types of studies which may be conducted in Stage 2
Lack of information about values and assets of coastal use areas including the social, cultural and economic characteristics of beach, surf zone and foreshore use for residential, commercial (including tourism) and recreational purposes.	Studies to determine the social, cultural and economic value of the coastal use area. This may include consideration of: • The value of assets (natural and built) and the economic value of coast-dependant industries such as tourism, fisheries and ports. • Usage and value of amenity of coastal use areas and critical coastal access infrastructure. This will include surf clubs, seawalls protecting foreshore reserves and/or providing promenades, surfing reserves and access to the surf zone. • Opportunities for increasing employment in economic activities that pertain to the sustainable development of the coastal use area.
Changing spatial patterns in coastal land use and vulnerabilities.	Mapping the locations of urban development (such as private residences and commercial buildings) that are within the coastal use area and updating the information whenever the hazard and risk assessment is updated.
Coastal development – applying the *Coastal Design Guidelines for NSW*	Studies to identify opportunities to: • redesign and redevelop coastal use areas to protect and enhance their scenic, social and cultural values and enhance resilience of coastal communities • enhance urban designs that ensure the bulk, type, scale and size of development is appropriate to the coastal location • incorporate water sensitive design into urban development • provide more public open space for recreational activities • address the impact of back beach and estuary/lake foreshore buildings on overshadowing of the beach, foreshore and associated parkland, and on wind funnelling.
Uncertainty about willingness to contribute to the cost of coastal management.	Studies to determine the willingness to contribute to the cost of: • upgrades to coastal assets and facilities which enhance access or amenity at beaches, headlands or longer sections of the coast

Potential issues	Types of studies which may be conducted in Stage 2
	• protecting public assets affected by coastal hazards • modification or relocation/redesign of public assets that are impacting on coastal ecosystems (for instance, stormwater and wastewater infrastructure systems) • protecting private property from coastal hazards, up to a specified design life • relocating to another location in the same local government area, but outside coastal risk areas, with or without a financial incentive • innovative residential designs to accommodate coastal hazard impacts.
Lack of information about existing development, and its use.	Studies to document the general age and type of construction of developed areas. Development of a community profile that will provide information about the demography of property owners in a coastal use area. This includes age, period of ownership, resident or absentee owner.
Poorly designed or managed development in coastal use areas impacting on the health, function and resilience of coastal environment areas and coastal wetlands and littoral rainforest areas.	Studies to identify the impacts of development and opportunities for management responses that protect the values of other coastal management areas. Studies of opportunities to zone coastal dunes to allow for transgression or migration in areas where climate change and sea level rise (or other shorter-term processes) may lead to landward migration of the frontal dune, driven by landward movement of sediment (wash-over and wind-blown).
Land tenure.	Studies to identify and map broad categories of Crown land, council land and private land, and how these relate to the key natural, economic and social assets of the area.
Community use	
Community access and recreation.	Studies to determine the significance of coastal recreational activities at the local, regional and state scale. This may include matters such as outstanding surfing breaks, recreational fishing localities, sailing waters or views. Studies to determine the need for access facilities such as car parking, cycleways and pathways to accommodate a growing permanent or visitor population wanting to participate in recreation activities at the coastline. Studies of the need for coastal safety programs in relation to beach, breakwater and rock platform use. Studies of potential threats to recreational activities such as boating, fishing and surfing. Studies of threats to surfing reserves and opportunities for additional reserves. Studies of potential pressure on coastal biodiversity from increased recreational use and identifying opportunities to manage these impacts. Studies to determine opportunities for alternative beach/coast access locations, including access to foreshores and access to waterways and the marine estate.
Potential impact of hazards and mitigation options.	Studies to determine how specific coastal recreational values (including access and visual amenity) and coastal recreation such as surfing and walking would be impacted by coastal hazards or by potential hazard mitigation options, and opportunities to mitigate these impacts. As noted above, community recreational and visual amenity values may have a significant impact on the selection of appropriate dune management options and on objectives for the morphology and vegetation of beaches and dunes.

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Potential issues	Types of studies which may be conducted in Stage 2
Impacts of agricultural land uses.	Studies may address matters such as the impacts of stock grazing on dunes, estuary foreshores and in wetlands, or runoff from intensive agriculture areas to coastal waterways and the marine estate.
Historic cultural heritage	
Cultural heritage.	Studies to identify items/areas of cultural heritage and the potential threats to cultural heritage. Urban design studies of the present and future desired characteristics of the 'place' regarding future land use planning and development controls. Opportunities to protect and conserve cultural heritage.
Historic heritage features including lighthouses, shipwrecks, entrance training walls, historic ocean wharves.	Studies to review the local heritage register to identify any features that are located within coastal use areas or whose management requires integration with management of coastal environment areas, coastal wetlands and littoral rainforests areas, or coastal vulnerability areas. Opportunities to protect, conserve and raise awareness of heritage sites.
Aboriginal cultural heritage	
Aboriginal cultural heritage.	Aboriginal cultural heritage studies may include the: • cultural value of coastal ecological communities on public land • condition assessment of gazetted Aboriginal sites and places that are on public land • interactions of issues on land owned and managed by Aboriginal organisations and on land in other tenures. Identify opportunities to acknowledge Aboriginal peoples' spiritual, social and customary use of the coast.
Geological heritage	
Geological heritage.	Studies to investigate the condition of, access to and threats to geological heritage sites. Opportunities to protect, conserve and raise awareness of geological heritage sites.

Our future on the coast

NSW Coastal Management Manual Part B: Stage 3 – Identify and evaluate options

NSW GOVERNMENT

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Identify and evaluate options

Stage 3 involves the identification and evaluation of management options.

This includes:

- identifying and collating information on management options
- evaluating management actions, considering:
  - feasibility (is it an effective and sustainable way to treat the risks?)
  - viability (economic assessment)
  - acceptability to stakeholders
- engaging public authorities about implications for their assets and responsibilities
- evaluating mapping options and implications if a planning proposal is being prepared
- identifying pathways and timing of actions
- preparing a business plan for implementation.

3.1 Overview of Stage 3

The following sections of the *Coastal Management Act 2016* and associated mandatory requirements in Part A are most relevant to this stage.

Section 14 Preparation of coastal management programs.

Section 15 Matters to be dealt with in a coastal management program.

Stage 3 of the coastal management program (CMP) process involves councils identifying coastal management issues affecting the areas to which the CMP is to apply and identifying coastal management actions required to address those coastal management issues in an integrated and strategic manner. The aim is to develop strategies and identify coastal management actions that address coastal management issues, reduce exposure to coastal hazards, and to take advantage of opportunities, consistent with provisions in section 14 and 15 of the *Coastal Management Act 2016* (CM Act). Councils also decide the priority of identified coastal management actions and propose integrated and strategic delivery pathways.

In previous stages, councils will have developed and shared an understanding of the coastal management issues, including an analysis of the risks, vulnerabilities and opportunities in their local area. This information helps to determine what coastal management actions may be identified in a CMP to address coastal management issues in an integrated and strategic manner.

In Stage 3, councils identify and evaluate management options to select preferred coastal management actions with a focus on achieving the objects of the CM Act. When selecting coastal management actions to be included in a CMP, councils must promote the objects of the CM Act and give effect to the management objectives for each coastal management area as required, among other things.

3.2 Steps in Stage 3

In Stage 3, it is recommended that councils complete four main steps (refer to **Figure B3.1**).

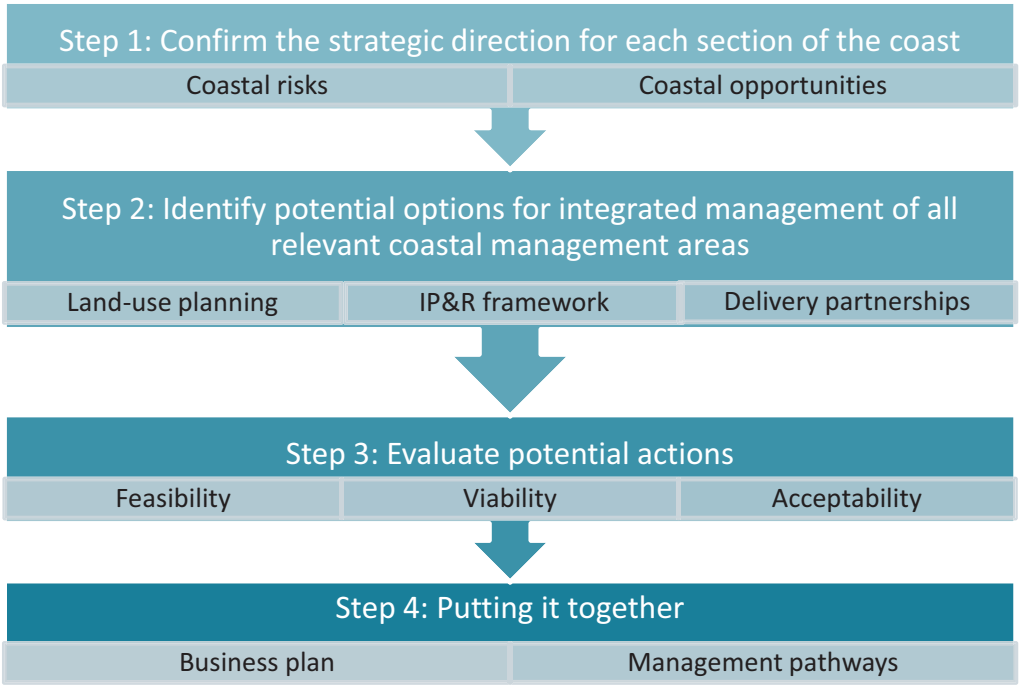

Figure B3.1 Four main steps in action identification and evaluation

Step 1: Confirm the strategic direction

It is recommended that councils review the strategic direction identified in Part B Stage 1 of the manual for each relevant coastal management area, to confirm that it reflects:

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

It is also important to consider if any previously identified thresholds for changing the management approach have been reached.

Step 2: Identify potential management options

Where the risk assessments in Stages 1 and 2 of Part B of the manual have identified unacceptable risks in any of the coastal management areas, the potential options may include risk treatment measures to address those risks.

Different strategic approaches are relevant to different levels of risk and attitudes to risk. The management options suggested for each of the coastal management areas in this stage of preparing a CMP can be organised into five broad categories:

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

These strategic approaches can be adopted on their own for specific locations or issues; however, they are often combined or the emphasis may change from one to another over time as circumstances change. **Section 3.9** provides further information on linking actions over time and adaptation pathways.

The potential coastal management actions may best be implemented individually or by a combination of stakeholders, for example:

- by council through its land use planning instruments
- by council through its Integrated Planning and Reporting (IP&R) framework
- by council in conjunction with adjoining councils
- by or in conjunction with public authorities
- by or in conjunction with other organisations such as universities or industry groups
- by community and volunteer groups
- by private landholders.

Important considerations when planning the timeframes for implementing coastal management actions include the:

- variability of coastal processes and hazards
- variability of processes in coastal ecological systems (ecological health)
- asset life of public and private development and essential infrastructure
- life expectancy of strategic land use planning decisions
- rate and type of economic and social change in the coastal zone
- the proposed adaptation pathway, including agreed thresholds and triggers.

Sections 3.4 to 3.7 provide details about the types of coastal management actions which may be appropriate for the four types of coastal management areas.

The Marine Estate Management Authority Strategy (MEMA Strategy), is likely to recommend some actions that could be considered along with other coastal management actions identified at this stage. It would also be helpful to establish any projects or pilot programs being undertaken through the MEMA Strategy in the area covered by the CMP. This will be most relevant for CMPs covering estuaries.

Step 3: Evaluate potential actions

Coastal management actions can be prioritised through examining the feasibility, viability and acceptability of coastal management actions (summarised in **Figure B3.2**), over a range of timeframes.

Figure B3.2 Components of the evaluation of recommended coastal management actions

Important considerations include:

- promoting and achieving the objects of the CM Act
- meeting the coastal management objectives within the coastal management areas
- the environmental, social, cultural and economic context and potential impacts
- the vulnerability and risks
- the feasibility of coastal management actions: determined by effectiveness, practicality and reliability of the measure or technology
- viability of implementation: determined by anticipated cost, availability of resources, time and commitment and anticipated benefits
- the acceptability of the risks to the council, key stakeholders such as public authorities, and the community, including willingness to contribute to the upfront and ongoing maintenance costs.

During the evaluation component of Stage 3 of Part B of the manual councils will need to think about the:

- roles and responsibilities of particular stakeholders
- approval processes and legislative requirements
- time required to plan, design and implement a coastal management action
- staging and sequencing of coastal management actions
- cost of different coastal management actions, including long-term maintenance
- benefits and beneficiaries of implementing the coastal management action
- disadvantages of implementing the coastal management action and how they are distributed across stakeholders, community and environment
- level of uncertainty associated with the outcome.

Section 3.8 provides further information about the evaluation process.

Step 4: Putting it together – document the rationale

It is important to consider how the proposed coastal management actions will be implemented over time, within an adaptive pathway that includes thresholds and triggers for change; **Section 3.9** provides details.

A business plan demonstrates viable funding mechanisms for implementing proposed CMP actions that are consistent with council's Integrated Planning and Reporting (IP&R)

framework including its resourcing strategy and asset management plan; **Section 3.10** provides details.

3.3 Involving the community and stakeholders in Stage 3

Stage 3 involves input from a range of stakeholders from council, public authorities and the community. The engagement process is designed to facilitate community and stakeholder involvement in identifying and evaluating local and regional-scale coastal management actions and determining their viability and acceptability. Specific consultation activities will be drawn from the engagement strategy prepared in Stage 1 of Part B of the manual.

3.3.1 Engagement within and between councils

Council officers responsible for the preparation or update of the CMP may need to brief councillors about the evaluation and option selection processes. It is also important to liaise with relevant sections of council, such as those involved in land use planning, asset management and community development, about potential or proposed coastal management actions.

Consultation with adjoining councils may assist regional collaboration and facilitate a coordinated approach to the management of coastal issues that cross council boundaries.

3.3.2 Engagement with public authorities

Consultation with other public authorities about any proposed coastal management actions that are recommended to be their responsibility, or that may affect their land and/or assets, including coastal management actions in a coastal emergency action subplan will be an important consideration.

Aims of engagement during Stage 3 include:

- the integration and coordination of council and public authority delivery programs
- streamlined review and approval processes
- reduced duplication
- public authority commitment to implementing relevant coastal management actions in the CMP.

3.3.3 Engagement with the community

The decisions made in Stage 3 of Part B of the manual may have significant implications for coastal communities. Councils may need to revisit the engagement strategy prepared in Stage 1, to make sure it remains appropriate. This is important if the results of studies in Stage 2 have changed the understanding of the level of risk or the knowledge base for decision-making.

In Stage 3, community engagement may include discussion about issues such as:

- awareness and knowledge of coastal threats, vulnerabilities, risks, thresholds and potential management actions
- awareness of residual risks and emergency responses

- the community's acceptance and tolerance of risk
- costs and benefits of coastal management actions
- the community's role in implementing coastal management actions
- distribution of benefits and impacts of different coastal management actions, to public and private interests, including any unintended consequences
- financial affordability, willingness to pay for upfront and ongoing management costs
- how coastal management actions could be sequenced to build resilience and maximise flexibility and adaptability

Figure B3.3 Community engagement is important at each stage of CMP development, Lake Illawarra, September 2016 (Photo: D Wiecek/OEH)

3.4 Managing coastal wetlands and littoral rainforests areas

Coastal management actions for coastal wetlands and littoral rainforests areas will focus on considering, promoting and achieving the objects of the CM Act and the management objectives for the coastal wetlands and littoral rainforest area.

Some councils and public authorities have existing programs or plans of management that manage coastal wetlands and littoral rainforests for conservation, restoration, education or low key recreational access and use. These include boardwalks and fencing, interpretation and education activities, clean-up and litter reduction programs and habitat management activities.

Figure B3.4 **Hare Point Track estuarine wetlands including saltmarsh and mangroves Carama Inlet northern shores of Jervis Bay** (Photo Michael Van Ewijk/OEH)

Figure B3.5 Wooden boardwalk through littoral rainforest, Sea Acres National Park (Photo: R Cleary, Seen Australia/OEH)

The effectiveness of existing strategies will have been considered in Stage 1 of Part B of the manual. Where the existing management arrangements have the capacity to control emerging threats and risks, and support emerging opportunities, maintenance of existing management may be appropriate. In this situation, consideration may be given to monitoring to identify if risk is increasing, decreasing or staying the same.

Additional coastal management actions may be required where current management is not appropriately addressing the threats to the values of the coastal wetlands and littoral rainforests, or when risks are increasing over time, and cannot be managed by the existing arrangements.

Coastal management actions for coastal wetlands and littoral rainforests may include:

Alert

- continued monitoring of the health and condition of coastal wetlands and littoral rainforests
- identifying thresholds and triggers for possible future intervention
- community education and awareness.

Avoid risk

- recommend that land use planning controls be adopted to ensure that proposed development will not impact on coastal wetlands and littoral rainforests
- recommend a planning proposal that will amend the extent of the coastal management area maps
- recommend the consideration of conservation agreements and possible changes in land tenure to provide protection.

Active intervention

- enhance opportunities for restoration of degraded wetlands to improve habitat values and ecosystem functioning
- promoting the improvement of flows and water quality entering wetlands and littoral rainforests
- recommending the construction of artificial wetlands or habitats
- recommending mosquito control
- recommending litter control and clean-ups
- recommending feral animal and weed control
- promoting enhanced and appropriate access to and use of wetlands and littoral rainforests.

Planning for change

- work towards establishing habitat migration pathways in response to climate change and sea level rise
- work towards establishing wildlife corridors to connect refugia
- promoting improvement of the resilience of wetlands and littoral rainforests to climate change
- work towards removing or altering the operation of works such as floodgates, levees, drains and culverts to facilitate ecological change
- identify opportunities for potential land acquisition to promote the protection, enhancement, maintenance and restoration of wetlands and littoral rainforests.

Emergency response

- plan emergency responses that limit the consequences of large and/or unpredicted events, such as major coastal storms, bushfires, droughts, pollutant spills, acid sulfate and low dissolved oxygen events, or sewage overflows.

3.4.1 Identifying and selecting strategic approaches

In general, coastal management actions that may have the effect of **alerting** and **avoiding risk** are appropriate for wetlands and littoral rainforests that are in good condition or where current threats are relatively low. **Active intervention** coastal management actions are appropriate when threats are currently impacting on the health, function or resilience of coastal wetlands and littoral rainforests.

Coastal management actions that are part of the **planning for change** group of recommended actions may be considered when the changes to condition and function are likely to be permanent.

Emergency response coastal management actions may include preparation for coordinated and rapid response to protect coastal wetlands and littoral rainforests, such as measures to control the spread of oil, sewage or other pollutant spills.

Further investment may be needed to support the work of volunteers, or for capital works that restore natural processes, or to maintain safe access or amenity, or to monitor the success of on-ground restoration programs.

Recommended coastal management actions for coastal wetlands and littoral rainforests are outlined in **Table B3.2** (in **Section 3.12**).

Figure B3.6 Coastal saltmarsh threatened ecological community (Photo: S Ruming/OEH)

Figure B3.7 Mangroves at the RAMSAR wetland, Towra Point (Photo: J Spencer/OEH)

3.5 Managing coastal vulnerability areas

Recommended coastal management actions for coastal vulnerability areas may focus on considering, promoting and achieving the objects of the CM Act and the management objectives for the coastal vulnerability area.

An important aspect will be assisting coastal communities to adapt to a dynamic and ambulatory shoreline over short and longer-term timeframes.

There are five broad strategic approaches which may be applied when managing risk in coastal vulnerability areas, consistent with the management objectives in the CM Act. These are depicted in **Figure B3.8** and outlined in **Table B3.3** (refer to **Section 3.12**).

Where possible, management approaches for areas exposed to coastal hazards or mapped as coastal vulnerability areas will focus first on enhancing natural defences such as sand dunes, vegetation and wetlands, and/or avoiding future risk by encouraging land uses that reduce exposure to coastal hazards.

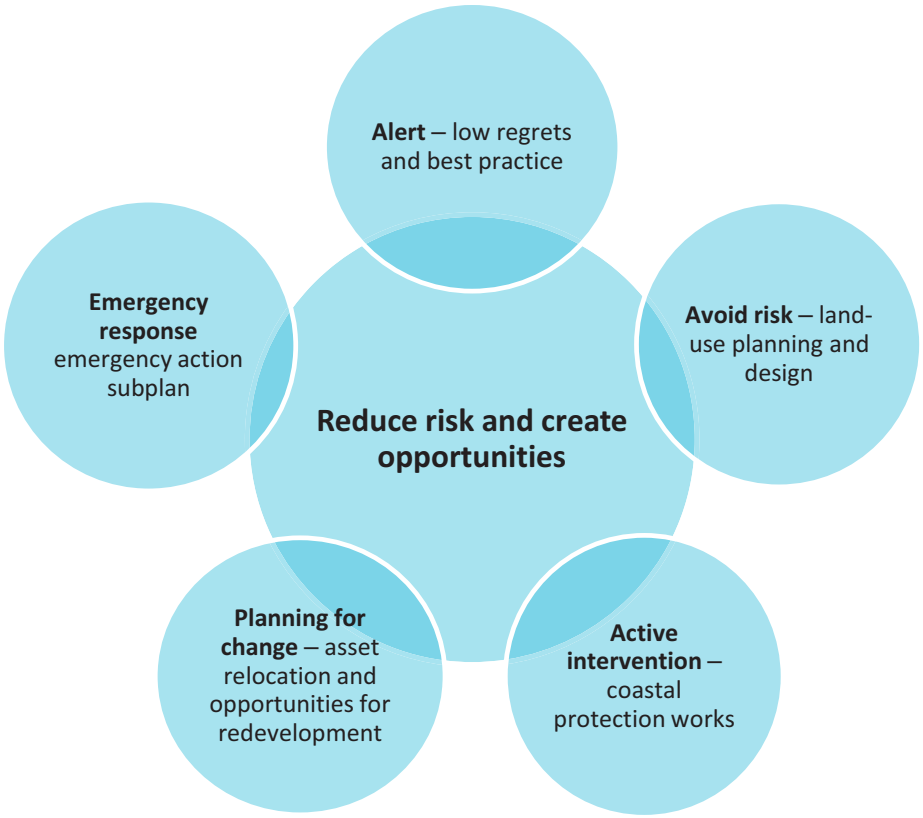

Figure B3.8 Strategic risk management approaches for coastal vulnerability areas

To achieve the best outcomes for any section of the coast, it is likely that a combination of approaches will need to be implemented over time as circumstances change and thresholds are reached.

When identifying the appropriate mix of strategic approaches, important aspects to consider will be the nature and type of the hazard. Mitigation strategies may differ for:

- areas subject to erosion, long-term recession or cliff collapse
- areas subject to coastal inundation that could be the result of a storm surge and wave overtopping
- tidal inundation areas, where services, access and liveability are intermittently disrupted and subsequently restored.

The nature and scale of existing and proposed development are also important considerations. The feasibility of risk management strategies may differ between lands that are:

- already developed, as there may be limited options, or a different range of options, for sites where the management issues are a legacy of past planning decisions
- greenfield (undeveloped) sites
- reserves, conservation areas and stretches of coast where there are neither built assets nor infrastructure likely to be threatened.

Other factors include:

- trends and expected changes to the type and intensity of coastal use and access to different coastal landforms (such as beaches, cliffs and estuary entrances)
- the potential to reduce the consequences by changing the management of coastal activities
- the capacity of a regional community to manage impacts, considering the value of existing development, its age and the ability of the community to invest in adaptive redevelopment.

Figure B3.9 Coastal protection works, Belongil Beach (Photo: P Davies/OEH)

Figure B3.10 Coastal protection works, Kingscliff (Photo: P Davies/OEH)

3.5.1 Alert

Low regrets responses to risks

Low regrets responses that are cost-effective, best practice and yield multiple benefits are likely to be part of any coastal risk management strategy overall timeframes.

Low regrets strategies are part of routine, best practice environmental management. They usually involve low cost and low impact actions that produce a net benefit now and help communities prepare for future changes to risk exposure. For instance, these actions often increase community awareness and involvement or achieve environmental improvement outcomes (enhancing resilience), as well as reducing risks.

Low regrets actions alone are seldom sufficient to manage medium to high risks but they do allow councils to strengthen coastal resilience and build management capacity.

Examples of low regrets actions in coastal vulnerability areas include:

- enhancing natural defences such as sand dunes, foreshore vegetation and wetlands
- community awareness and education programs about coastal processes of all coastal systems (open coast beaches and headlands, estuaries, lakes, lagoons, coastal wetlands and littoral rainforests)
- early warning systems and preparedness for storm events

- raising public awareness, education and understanding of coastal process, hazards and risks to public safety
- monitoring changes in the coastal environment, including long-term trends and responses to erosion, recession and inundation both on the open coast and in estuaries, lakes and lagoons
- monitoring community attitudes to risk
- monitoring use, safety and satisfaction with access and amenity
- monitoring development pressure and population change
- research to improve coastal knowledge and understanding
- identifying opportunities and preparing and planning for change
- identifying potential future threats, vulnerabilities and risks resulting from changing processes and climate change
- plans and strategies to improve resilience of coastal assets to the impacts of climate change and extreme events.

The environmental and social context and accepted best practice will change over time. The CMP could recommend changes to low regrets responses as circumstances change, to ensure they continue to deliver benefits efficiently and support other responses.

Natural defences

Natural defence actions include dune management, reshaping the beach (re-profiling and beach scraping), relocating nuisance wind-blown sand back onto a beach, relocating sand within a sediment compartment (sand back-passing) or adding sand to the beach (beach nourishment).

In estuaries and coastal lakes and lagoons, natural defences may include maintaining and enhancing foreshore revegetation and wetlands, managing stock access, beach nourishment and placing coarse (more resistant) material on the shoreline.

Re-profiling, beach scraping, sand back-passing and beach nourishment can be used to reinstate a beach system to:

- restore beach amenity and access
- reduce risks to public safety
- reduce risks to development
- offset the impacts of protection works
- protect and enhance significant vegetation, habitat or cultural heritage values.

Re-profiling, beach scraping and sand back-passing involves transferring sand from one part of a beach to another or within a sediment compartment. The purpose is to return sand which has been eroded from the beach and moved to another location.

Beach nourishment is the replenishment of an active beach system using imported sediment of a similar size to balance erosion losses, re-establish the beach or to form a wider dunal zone to act as an erosion buffer.

Minimum design standards for beach nourishment projects are outlined in **Box 3.1**.

Box 3.1 – Suggested design standards for beach re-profiling, beach scraping and beach nourishment

Where beach re-profiling, beach scraping and beach nourishment are the preferred management action, the following provides the minimum design standards:

- The landward extent of the work is recommended be limited to the existing erosion scarp or the seaward edge of dune vegetation.
- Earthworks associated with beach re-profiling are designed to avoid exposure or disturbance of underlying bedrock, coffee rock and other cemented sediment material or consolidated mud/organic material layers.
- Established vegetation is not to be buried or otherwise harmed by the work.
- Beach re-profiling and beach nourishment are to be finished to a stable slope consistent with typical beach and dune forms in the area.
- For beach re-profiling, sand is sourced from an intertidal area immediately seaward of the intended deposition area. For beach scraping and sand back-passing, sand is to be sourced from the active beach system and/or flood tide deltas in estuaries.

For major beach nourishment programs:

- The 100-year ARI (average recurrence interval) Zone of Reduced Foundation Capacity does not reach un-piled structures.
- After a one-year ARI erosion event, there is a 20-metre-wide dry beach on a mean high-water spring tide under average wave conditions.
- There is a 30-metre-wide dry beach for 90% of the time and provide for alongshore pedestrian access for 99% of the time.

Sand for beach re-profiling will have the following characteristics:

- The sand used for the work is to have a similar or coarser grading to the upper beach sand at the site, and a similar colour.
- The sediment contains less than 10% fines (i.e. sediment with a grain diameter of less than 0.06 millimetres).

Sediment for beach nourishment will have the following characteristics:

- The sediment is sourced from outside the active beach system of the sediment compartment or another approved site.
- The sediment consists predominately of sand (i.e. 90% of the sediment has a grain size diameter greater than 0.06 millimetres).
- The sand used for the work has a similar or more coarse grading to the upper beach sand at the site.
- The sediment contains less than 10% fines (i.e. sediment with a grain diameter of less than 0.06 millimetres).
- The sediment is clean, free of contaminants and does not contain any deleterious material such as builders' waste or rock.

Figure B3.11 Beach nourishment, Jimmy's Beach (Photo: Great Lakes Council)

3.5.2 Avoid

The land use planning framework can be used to avoid risk arising from the dynamic and ambulatory nature of shorelines and foreshores of the open coast (including sandy beaches and coastal cliffs and bluffs), and estuaries, lakes and lagoons. It is recommended that any risk approaches are implemented early so they can provide long-term benefits.

Figure B3.12 Beach scraping at New Brighton Beach, Byron Shire Council (Photo: B Fitzgibbon/Byron Shire Council)

An avoid risk approach is particularly relevant for greenfield sites where planning controls can facilitate new development and associated infrastructure being sited in low-risk areas or outside a coastal vulnerability area for a relevant timeframe.

A CMP may include recommendations to manage risk and provide opportunities for strategic controls on land use in two different ways:

- strategic planning and investigation to identify areas suitable for future development (consistent with the s. 9.1 direction relating to coastal management)
- recommendations for changes to land use planning and development controls, such as permitted and prohibited uses for zones and design standards in a development control plans (DCP).

Examples of land use planning recommendations that may be considered in a CMP to avoid future risk include:

- Recommending the location of new or replacement essential infrastructure in low-risk areas or outside of mapped coastal vulnerability areas for relevant timeframes. This will result in significant savings/benefits for councils, public authorities and the community.

- Recommending locating new critical infrastructure landward of the 100-year 1% probability line and outside of the area rarely impacted by coastal hazards.
- Identifying land suitable for future settlement in regional and local-scale settlement strategies. This future development could be outside the mapped coastal vulnerability areas, considering hazard impacts from storms and flooding at least equivalent to a one in 100-year ARI event (that is, an event with a 1% probability of occurrence in any year) for a 100-year planning horizon.
- Identifying areas where redevelopment or infill development is not acceptable due to risks.
- Identifying development types, design standards and controls to allow appropriate development to occur in areas where coastal risks are anticipated to change over time. Councils could consider the risk, the level of uncertainty, the desire not to unnecessarily sterilise coastal land and the importance of avoiding future legacy problems.
- Identifying and recommending alternative development sites to accommodate existing development that is expected to be displaced by shoreline recession or inundation in the future.

Councils may wish to recommend the inclusion of additions to their Development Control Plan or consent conditions. These may include guidance on:

- only permitting time-limited and removable structures in the short-term, high probability hazard impact area appropriateness of removable or relocatable assets such as lifeguard towers or picnic shelters seaward of the 50-year 90% exceedance line
- more readily movable development may be encouraged for areas between the 50-year 90% exceedance line and 50-year 50% exceedance line
- appropriateness of relocatable dwellings (with appropriate consent conditions) between the 50-year 50% and the 50-year 10% exceedance line
- appropriateness of traditional housing on pile foundations, between the 50-year 10% and the 50-year 1% exceedance line.

Note: The '50-year 50% exceedance line' is the landward position of the shoreline that has a 50% probability of being exceeded in the next 50 years. The examples above are not intended to be prescriptive and can be amended by local considerations.

Land use zones in coastal areas may be used to encourage appropriate new development and create opportunities for coastal communities to be sustainable and resilient. Zoning is a mechanism to relocate settlement away from the area affected by hazards while maintaining community cohesion, resilience and socioeconomic viability. Examples of zoning changes councils could consider recommending include:

- zoning land likely to be subject to extreme events as open space to provide valuable access and recreation space (noting that compensation may need to be considered if the land is in private ownership)
- zoning land as open space (with necessary compensation if changing from a private land zoning) to facilitate migration of ecological communities such as saltmarsh (noting that compensation may need to be considered if the land is in private ownership)
- zoning areas as working waterways to encourage coast-dependent development, such as marinas and fishery infrastructure or tourism-related activities
- identifying opportunities for improved coastal access and public use on land acquired by a public authority
- encouraging new residential development to occur on land outside coastal vulnerability areas where appropriate.

These actions recognise the local and regional-scale effects of coastal processes and the dynamic and ambulatory nature of the shoreline.

Progressing a planning proposal

In Stage 3, an evaluation of the mapping options and implications to determine the extent of the coastal vulnerability area may be required. It is important that councils consult with affected communities, stakeholders and public authorities about the mapping options and the implications. This will help councils to define the appropriate area where it is recommended that changes to planning controls will occur.

3.5.3 Active intervention

Active intervention approaches may be recommended and implemented over short or longer-term timeframes, as risk, management cost and community objectives change. They aim to mitigate current and future risks from coastal hazards, taking into account the effects of climate change and the dynamic nature of the shoreline.

Accommodate risk responses

Accommodate measures are designed to reduce the immediate to medium-term consequences of risks in areas exposed to coastal hazards and coastal vulnerability areas. This approach may extend the time a development can remain in place or a use can continue.

This can be achieved by recommending modifying the current land used to be more resilient or changing to a less vulnerable land use or development.

Accommodation strategies are usually more effective for hazards that do not lead to complete or permanent loss of built assets or where the built assets that are lost are of low value. In some cases, avoid risk management responses (**Section 3.5.2**) will be used in conjunction with 'alert' and accommodate risk responses.

Coastal management actions may include recommendations involving:

- Retrofitting buildings and infrastructure, including roads and sewer systems.
- Enhanced or redesigned drainage systems.
- Changes to design requirements for infill and redevelopment of existing development areas.
- Strategic planning to reduce risk by relocating, or increasing the elevation of, infrastructure assets during maintenance or at the end of the asset life, without changing the general function and use of the land.
- Responses encouraging:
    - raised floor levels
    - movement of assets and infrastructure
    - reinstating and maintaining natural defences such as dune management, beach re-profiling or beach nourishment.
- Providing additional and regular information to affected landowners about in coastal hazards and risks, and the performance of management actions.
- Improving the resilience of coastal assets to climate change.
- Potential tenure arrangements to not sterilise land use in the short to medium-term. These may include easements, voluntary purchase and leaseback.

Coastal protection responses

Coastal protection options are generally proposed when the coastal vulnerability area overlaps with a coastal use area that has high-value uses or assets. Section 27 of the CM Act and clause 19 of the State Environmental Planning Policy (Coastal Management) 2017 (CM SEPP) relate to development consent and approvals for coastal protection works carried out by public authorities and other persons.

A range of options are available where a council and its community has determined that protection of significant public and/or private infrastructure or other community assets is desirable. The choice will be influenced by the local context and acceptability to the community.

In the first instance and wherever possible, the priority is restoring or enhancing natural defences such as coastal dunes, vegetation or wetlands and maintaining natural processes and functions as much as feasible.

It is important not to overestimate the resilience of natural defences to long-term coastal change, or their capacity to protect assets on receding coastlines.

Structural protection works

Structural protection works are an option when natural defences are not sufficient to reduce risks from coastal hazards to an acceptable level. They include:

- seawalls and revetments
- entrance breakwaters
- groynes
- artificial reefs
- levees and drains
- cliff stabilisation works.

Examples of potential structural protection works are summarised in **Tables B3.3** and **B3.4** (in **Section 3.12**).

Each structural protection option has advantages, disadvantages and impacts, and careful evaluation is necessary before a protection action is included in a CMP. Coastal protection measures may be designed and implemented to create modified and diversified habitat or to improve public access and amenity.

Approvals for coastal protection works

Section 27 of the CM Act and clause 19 of the CM SEPP relate to development consent and approvals for coastal protection works carried out by public authorities and other persons.

Design standards for coastal protection works

When proposing structures such as seawalls and revetments for the protection of public infrastructure or private assets, it is most important that design criteria are clearly stated and that minimum design criteria for stability and safety are met.

The engineering design event (stormwater level and wave conditions) is determined from the accepted probability of exceedance over the design life of the structure.

It is recommended that a seawall is designed to be consistent with the design life of the development or assets it protects (typically for residential or commercial development it will

be 50 or more years). Allowing for not more than 10% probability of event exceedance over the design life requires the engineering design event to be at least the 1 in 500-year ARI.

Effective seawalls are recommended to be designed with due allowance for beach scour at the toe and overtopping/over-wash of the crest. Risks to adjoining public and private land and mitigation measures are also important considerations.

Where a seawall or revetment is critical to the protection of important infrastructure or high-value or sensitive development, or where the seawall/revetment is intended to provide protection for 20 years or more, rigorous design and testing are necessary to manage risks.

It may be necessary to undertake testing of such seawalls/revetment designs with physical models to demonstrate their capability and fitness-for-purpose.

Box 3.2 outlines design criteria for seawalls and revetments. These requirements are based on Australian Standard AS 4997–2005 Guidelines for the Design of Maritime Structures (Standards Australia 2005).

It is recommended that all planning for proposed coastal protection structures acknowledge the concept of residual risk associated with events larger than the design event. Potential impacts include overtopping, out-flanking or failure of protective structures. Coastal protection structures (such as seawalls or groynes) have an asset life and a defined period when they are expected to be effective.

Councils develop a coastal zone emergency action subplan where required to address residual risk (see **Section 3.5.5**).

Figure B3.13 Geotextile sandbag wall, Kingscliff (Photo: M Daley/OEH)

Figure B3.14 Seawall at Kogarah Bay showing step-type seawall with a bench of saltmarsh vegetation (Photo: D Wiecek/OEH)

Box 3.2: Recommended criteria for design of seawalls and revetments on the open coast

Where protection is to be the recommended management option, and seawalls/revetments are the method of protection, the following provides a minimum level of standards for the design and construction of seawalls and revetments:

- Seawalls and revetments are to be designed and constructed to achieve the design life necessary to provide protection for the asset/land used to be protected, for its design life. For example, where a seawall or revetment is to protect residential or commercial development the design life of the structure is to reflect the proposed land use design life, typically for residential/commercial development 50 to 60 years. For less intensive development such as public facilities or relocatable development the design life may be less, but for essential or critical infrastructure, the design life may be greater.
- The selection of the design life will determine the necessary design criteria such as the design storm conditions (wave height, period and water levels) that will ensure the design life has at least a 90% probability of being achieved.
- It is recommended that all seawall and revetment designs with proposed lives exceeding 20 years are tested with physical models to demonstrate their capability and fitness-for-purpose.
- The design scour level on the beach at the toe of a seawall or revetment shall be determined to achieve no undermining of the structure during its design life. For a seawall, the design scour level is to accommodate the additional scour due to the interaction of the seawall with wave action. For revetments, a fit-for-purpose toe apron (including geotextile filters of sufficient strength), is to be provided to accommodate any potential settlement of the structure during its design life.
- Seawalls and revetments are to be designed and constructed, to be structurally capable of resisting the design conditions required to achieve the design life, including adequate drainage to release pore pressures behind the wall, including excess pore pressures where overtopping occurs.
- Seawalls and revetments are to have a slope and primary armour size capable of resisting the design conditions required to achieve the design life, with no more than 10% damage, and to have suitable underlays and filters (including geotextile filters of sufficient strength to be fit-for-purpose) to support the revetment slope for the design life.
- The crests of seawalls and revetments are to be of sufficient elevation to ensure that any overtopping will not endanger public safety or assets. Where overtopping is envisaged in the design, there is to be suitable crest reinforcement to accommodate that overtopping. It is recommended that the design include adequate and effective provision for catching and draining overtopping water, without compromising the integrity of the seawall or revetment. Where the design includes any overtopping, testing with physical models, at an appropriate scale, is recommended to demonstrate the crest and drainage design is fit-for-purpose.

3.5.4 Planning for change

Councils may plan for a change to the location or extent of development and infrastructure in coastal vulnerability areas or areas with a high probability of significant impact from coastal hazards.

This situation may arise where coastal recession or permanent inundation is occurring and existing coastal assets, infrastructure, public safety, liveability and environmental values are being progressively lost or degraded.

Councils may adopt a staged approach that moves from accommodation and protection to relocation or realignment strategies over time, once a predetermined threshold has been reached. It also helps improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.

A staged, adaptive approach allows development in coastal vulnerability areas to remain in place until the risks to life and property become unacceptable. Temporary or time-limited planning approvals, as indicated in section 4.17 (1) (d) and (e) of the *Environmental Planning and Assessment Act 1979*, can be used if appropriate as part of a staged approach that provides certainty about the strategic direction. This helps landholders and users to prepare for change.

Where temporary or time-limited development is approved, it is important to have a clear plan for implementation, developed with and understood by the community. Clearly defined steps, thresholds and stages towards the removal or relocation of temporary development will assist community acceptance of the approach. This will help to reduce socioeconomic impacts and increase community acceptance when a change is required.

Recommending coastal management actions that may lead to managed realignment and asset relocation has a distinctive distribution of costs and benefits between public and private stakeholders that needs to be considered. Over time, managed realignment allows coastal and environmental processes to operate with minimal intervention.

The recommendation of coastal management actions that may lead to managed realignment of private development and associated public infrastructure is an option to consider in the CMP when:

- landowners and public authorities consider risks to existing development are unacceptable
- the public benefits of structural protection are low (e.g. only a few properties or individuals involved)
- benefits to the broader community of realignment are high
- it is not feasible to mitigate the impacts of protection works on coastal processes, environmental values, beach amenity or public access
- there are significant costs associated with remaining in place, and those costs are likely to be unaffordable or uneconomic
- there is a high degree of uncertainty about the likelihood and/or type and extent of impacts or benefits of coastal protection works
- when critical infrastructure or state significant development is not at risk
- there are significant opportunities to benefit environmental, cultural and social values including continued public access to a beach.

Recommending managed realignment may involve:

- intensive engagement and negotiation with affected landholders
- recommending the rezoning of land in the coastal vulnerability area

- recommending a change of tenure, easements or voluntary purchase and land acquisition
- specifying the thresholds and triggers for changing the response from accommodation or protection to managed realignment
- ongoing reporting and discussion with affected landowners and the community as responses are implemented
- recommending social adjustment packages and incentives to support affected property owners in cases where managed realignment is the only viable option
- prohibiting or not encouraging the protection and rebuilding of private assets located in the beach fluctuation zone, including during coastal emergencies
- considering options to deal with private assets in that particular area, which could include removing any waste, building materials or contaminants that endanger the public and restore the area
- an integrated and coordinated response involving public and private landowners and asset managers in the affected area
- public authorities recognising the proposed managed realignment strategy in plans of management and management activities for public land.

Thresholds and triggers may be linked to a specific magnitude or frequency of hazards, the condition of environmental or built assets, or the effectiveness of other measures.

In determining thresholds and triggers, the interdependencies between service-related infrastructure and development that is reliant on it (e.g. roads, water supply and sewerage systems), may be a consideration.

Managed realignment may also be a strategic response where the coastal vulnerability area overlaps with the coastal environment area or the coastal wetlands and littoral rainforests area. In these coastal management areas, managed realignment may involve allowing ecosystem migration and transformation to occur.

Examples include restoring intertidal habitat by removing a seawall, or by allowing a coastal saltmarsh to migrate landward with long-term rising sea levels. Recommendations of managed retreat of ecological communities is recommended to be considered for natural areas of coastal public land. Further details about this approach for these coastal management areas are in **Section 3.6**.

3.5.5 Emergency response

Emergency response will be required to address residual risks that remain after all mitigation measures have been implemented. Emergency responses aim to:

- protect human life and public safety
- minimise damage to property and assets
- minimise impacts on social, environmental and economic values
- not create additional hazards or risks.

Effective coastal emergency responses will prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal emergency. They will also help to improve the resilience of coastal communities and reduce their future reliance on emergency responses.

Coastal zone emergency action subplans

A CMP will include a coastal zone emergency action subplan (CZEAS) if the local government area includes land within the coastal vulnerability area and beach erosion, coastal inundation or cliff instability are occurring on that land.

A CZEAS is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or an irregular event. The roles and responsibilities include the carrying out of works for the protection of property affected, or likely to be affected by beach erosion, coastal inundation or cliff instability.

When preparing a CZEAS, councils must consider and promote the objects in section 3 of the CM Act and give effect to the management objectives for the coastal vulnerability area (in s.7 of the CM Act).

In preparing a CZEAS as part of the CMP, it is recommended that councils:

- identify objectives and scope of the CZEAS, consistent with the objects of the CM Act, management objectives of the coastal vulnerability area (CVA) and the strategic direction in the CMP
- review effectiveness of existing emergency management responses
- identify and map land within the coastal vulnerability area which is, or may be, affected by beach erosion, coastal inundation or cliff instability
- consult with public authorities that own or manage land or assets in the coastal vulnerability area that may be affected by beach erosion, coastal inundation or cliff instability and seek their agreement to any proposed actions to be included in the CZEAS
- consult relevant emergency management authorities and committees to ensure the CZEAS does not include matters that are in plans made under the *State Emergency and Rescue Management Act 1989* (SERM Act)
- seek advice/clarification on the scope of the CZEAS from Office of Environment and Heritage (OEH) or the NSW Coastal Council, if necessary

Under the CM Act a CZEAS must outline:

- the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or an irregular event; and
- any works to be carried out for the protection of property affected or likely to be affected by beach erosion, coastal inundation or cliff instability.

It is recommended that the CZEAS also include:

- the objective and scope of the CZEAS
- definition of coastal emergencies: beach erosion, coastal inundation and cliff instability
- criteria/thresholds for when a coastal emergency is occurring
- a map and /or register of land and assets that are, or may be, affected by beach erosion, coastal inundation or cliff instability
- coastal emergency actions for the four phases of emergency management: prevention; preparedness, response and recovery
- a protocol for communication and engagement before, during and after an emergency event.

Figure B3.16 shows emergency response actions that are consistent with councils' responsibilities and the principles for coastal emergency response.

Figure B3.15 Signage and fencing to prevent public access to eroded beach area, Byron Bay (Photo: S Holtznagel/OEH)

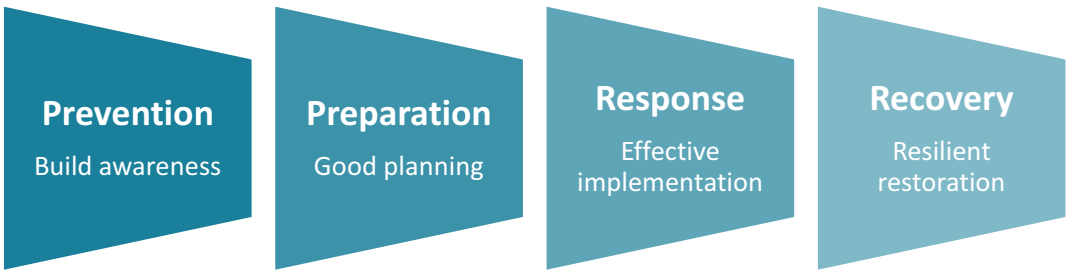

Figure B3.16 Emergency response in the coastal management context

3.6 Managing coastal environment areas

The key features of the coastal environment area are the coastal waters of the State, estuaries, coastal lakes and lagoons and land adjoining those features such as coastal cliffs and bluffs, rock platforms, sand dunes and riparian zones. The management objectives for coastal environment areas are to protect and where possible enhance, the natural and cultural values and ecosystem functions of these important areas.

Management actions for coastal environment areas will focus on considering, promoting and achieving the objects in the CM Act and the objectives for coastal environment areas. Due to the overlap with the marine estate, it is recommended that councils also consider the objects of the *Marine Estate Management Act 2014*.

Coastal management actions may also be designed to protect and enhance coastal environmental values and natural processes and to enhance natural character, scenic value, biodiversity values and ecosystem integrity.

Management actions designed to reduce threats and improve the resilience of coastal waters and waterways, including in response to climate change are appropriate. Actions that maintain or improve water quality and estuary health, and maintain the presence of beaches, dunes and natural features of foreshores will be consistent with the objectives of the coastal environment area.

It is important that coastal management actions that support social and cultural values of coastal waters and waterways and maintain or improve public access, amenity and use of the coastal environment area are also considered.

Like coastal wetlands and littoral rainforests, the broad strategic approaches to management of coastal environment areas may include:

Alert

- continued monitoring of the condition of coastal environment areas
- identifying thresholds and triggers for change and future intervention
- raising public awareness, education and understanding of coastal process and values and the implications of threats and hazards for the amenity, wellbeing and prosperity derived from the coastal environment.

Avoid

- recommending the implementation of land use planning controls, zoning, management plans and tenure arrangements to protect and enhance the coastal environmental values and natural coastal processes, including biodiversity, ecosystem integrity and resilience
- recommending the progression of a planning proposal to amend the extent of the coastal management area maps
- reducing adverse impacts and where possible enhancing the natural character, scenic value, biological diversity and ecosystem integrity
- considering the cumulative impacts of proposed development.

Active intervention

- enhancing opportunities for the enhancement and restoration of degraded habitats
- reducing threats and risks to coastal waters, foreshores and natural environment areas
- maintaining and improving water quality and estuary health
- improving public access to environment areas, foreshores and waterways.

Planning for change

- identifying opportunities to maintain the presence of beaches, dunes and natural features of the foreshore
- preparing to allow nature to take its course so that coastal landforms and ecological communities can change over time
- planning for habitat migration and identifying wildlife corridors
- identify opportunities for land acquisition to promote the protection, enhancement, maintenance and restoration of coastal environments.

Emergency response

- managing the impacts of intermittent very large events and encouraging recovery and resilience
- actions to limit the consequences of large and/or unpredicted events, such as a major coastal storm, bushfires, droughts, pollutant and oil spills, toxic algae and pathogen events, acid sulfate and low dissolved oxygen events, or sewage overflows.

Figure B3.17 Volunteers undertaking weed control, Hat Head National Park (Photo: N Cubbin/OEH)

3.6.1 Identifying and selecting strategic approaches

It is generally considered easier and more cost-effective to protect and enhance coastal ecosystems (and particularly sensitive ecosystems such as coastal lakes and lagoons) that are in good condition than to attempt to return areas in a poor condition to their natural state.

Where coastal ecosystem health is good, councils may seek to maintain and enhance this condition through **avoid** approaches. This includes recommending land use and infrastructure planning decisions that support appropriate community uses of the coastal environment and avoid irreversible impacts. **Alert** responses may also be implemented to monitor conditions and ensure communities are aware of emerging changes.

If coastal ecosystem health is poor or uses of the coastal environment are impacted by poor ecosystem health, councils may seek to improve the condition of coastal landforms and ecosystems through a range of **avoid** and **active intervention** approaches.

These may include minimising further impacts on coastal landforms and ecosystem health with recommending appropriate land use planning. Councils may also seek to reduce current pressures on ecosystem health and identify and manage future pressures.

In some situations, removing the pressure may allow the system to recover naturally; in other situations, active rehabilitation or offsets may be required. If funding for rehabilitation is

limited, prioritised, staged implementation with demonstrable (measurable) outcomes to indicate progress may be appropriate.

Remediation of degraded or contaminated sites in the coastal environment area may take many years before improvements in coastal ecosystem health are measurable. Consideration of an appropriate funding stream which can be sustained over the right timeframe for inclusion in council's Resourcing Strategy and Delivery Program.

The processes, landforms and shorelines that provide habitat for coastal ecological communities are dynamic and ambulatory. Natural systems are constantly adapting to new environmental circumstances.

Planning for change and allowing coastal environments to adapt to climate change is often a more cost-effective approach that will lead to higher value environmental outcomes. Habitat migration may be appropriate when monitoring demonstrates that change may be inevitable or irreversible.

The concepts of managed retreat or managed realignment may be recommended for a variety of natural coastal landforms and the coastal environment area. Examples include planning to allow:

- coastal dunes to migrate landward or to be eroded
- coastal wetlands to migrate with rising water levels
- areas to be inundated more frequently
- coastal entrances to adjust their position along the shore
- floodplain wetland to change from a freshwater to a saline ecological community.

For natural areas of public land subject to long-term environmental change, councils and public authorities may seek to recommend an approach that allows natural systems and processes to continue to adapt and maintain natural functions and values.

Emergency response may be used to address residual risks and natural disasters or events. Residual risks in coastal environment areas may include short-term but significant impacts on coastal waterways, foreshores and adjacent natural areas associated with major events, including events whose impact on the coastal environment area is exacerbated by development.

Emergency responses in these locations may recommend temporary works to manage algal blooms, oil spills or storm runoff, control access, or to protect sensitive but high-value natural assets such as nesting migratory shorebirds.

The CMP may recommend coastal management actions that can be implemented by the council or other public authorities or stakeholders.

The application of the five strategic approaches to coastal environment areas is outlined in **Table B3.5** (in **Section 3.12**). Some strategic approaches will address multiple risks.

Figure B3.18 Environmentally friendly seawall made with sandstone blocks at Bobbin Head, Cowan Creek, Hawkesbury River estuary (Photo: D Wiecek/OEH)

3.7 Managing coastal use areas

Management actions for coastal use areas will focus on considering, promoting and achieving the objects of the CM Act and management objectives for the coastal use area.

Management actions that ensure that the scale and form of development is appropriate for the location, cultural and built heritage and the natural scenic quality of the coast are most suitable. It is recommended that new development incorporate quality urban design including water sensitive urban design.

Coastal management actions for this area may be designed to intend to provide adequate public open space and infrastructure for recreation, including the use of the surf zone.

Coastal use areas may overlap with coastal environment areas and coastal wetlands and littoral rainforests areas. Council may wish to consider progressing a planning proposal to amend the extent of the coastal use area maps to achieve the management objectives.

Integration and coordination of approaches for the coastal environment area and coastal wetlands and littoral rainforests areas may assist to create sustainable opportunities for socioeconomic and cultural benefits for coastal communities.

Other important considerations include recreational access, residential land value and coast-dependent economic development are closely linked to the scenic amenity, safety and accessibility of waterways, beaches, headlands, foreshores and the surf zone.

Table B3.6 (in **Section 3.12**) identifies potential management actions for coastal use areas. **Sections 3.7.1** to **3.7.3** provide further information about opportunities and management challenges**.**

3.7.1 Design of coastal urban areas

It is recommended that councils attempt to facilitate coastal development that is consistent with the natural and existing urban components of the coast. This can be progressed by incorporating a mix of coastal management action types in these areas including **alert**, **avoid risk**, **planning for change** and **active intervention**.

The *Coastal Design Guidelines for NSW* recommend that coastal development is designed so that it:

- is aligned with the natural form of the coast
- protects scenic amenity
- has a design and scale consistent with the natural scenic quality of the coast, its culture and heritage character and built environment character
- incorporates designs and planning requirements that protect the natural assets and social values of the coast, including water sensitive design, preventing wind funnelling, overshadowing controls and accessibility management
- includes adequate public open space in developed coastal areas, including provision for diverse recreational activities
- enhances the accessibility of beaches, headlands, foreshores and the surf zone for community recreation and enjoyment
- ensures that the design and implementation of any coastal protection works consider the direct and indirect impacts on coastal access and amenity
- minimises public safety risks to local coast users and visitors
- avoids risks associated with the impact of coastal hazards on residential, commercial and community recreation areas, now and in the future
- protects and maintains the social cohesion of coastal communities.

Linking actions through council's Community Strategic Plan, Asset Management Plan and Delivery Program may assist in achieving these outcomes. By doing this, council will also implement **alert** management approaches, as these strategic planning tools require ongoing monitoring and reporting of progress, effectiveness and outcomes.

Effective implementation will also depend on the shared recognition of the priority of coastal access and amenity issues in council and public authority management plans, such as:

- council's community development plan, recreation plan, tourism/economic development plan, or cultural plan
- regional growth plans focusing on projections of population growth and the needs of coast-dependent business, such as tourism, fishing, accommodation and services
- plans of management for coastal crown reserves and national parks.

Figure B3.19 An example of water sensitive urban design: vegetated swale with floodway, Bankstown (Photo: P Vella/OEH)

3.7.2 Managing coastal heritage

Coastal management actions that aim to protect coastal heritage values and Aboriginal sites or places in a CMP may relate to archaeological sites or the maintenance or restoration of the values of a coastal Aboriginal cultural landscape that supports the continuing practice of cultural activities, teaching and knowledge transfer. It is recommended that any such coastal management actions be developed in close consultation with the relevant Aboriginal community members.

Figure B3.20 Dark Point Aboriginal Midden Site protected area, Myall Lakes National Park (Photo: J Spencer/OEH)

The CMP may also include management responses for other coastal heritage items such as shipwrecks, lighthouses, wharves, boatsheds and geological features, subject to consultation with the relevant authorities. There are also some use-related reserves, such as the national surfing reserves, that may be important considerations of management of heritage issues.

Figure B3.21 Shipwreck near Woolgoolga (Photo: R Cleary Seen Australia/OEH)

The CMP may propose amendments to existing Local Environmental Plans (LEPs), Development Control Plans (DCPs) and plans of management for reserves and places with cultural and heritage values, to better manage issues such as:

- the impact of uncontrolled access and use
- appropriate land use zoning to protect coastal heritage
- coastal hazards affecting the cultural and heritage values.

Opportunities may be identified to maximise linkages between the CMP and Aboriginal and non-Aboriginal cultural, historical or social heritage plans pertaining to the area. These links may be established through the council's Community Strategic Plan and specified in its Delivery Program.

In developing coastal management actions, an important consideration may be aligning with or enhancing heritage management programs for the heritage item. Effective implementation of heritage protection or management responses depends on integration of local and state level programs and priorities, so consultation with relevant public authorities is recommended.

Figure B3.22 Heritage boatsheds at Forsters Bay, Narooma (Photo: J Spencer/OEH)

3.7.3 Promoting and managing recreational uses

The CMP may include coastal management actions to maintain and enhance public access, amenity, use and safety in the coastal zone. Coastal management actions may be selected from **alert**, **avoid risk** and **active intervention** approaches and include projects which:

- protect and improve public access to beaches, headlands, waterways and surf breaks and associated viewing points
- provide access to areas of local biodiversity, scenic or heritage significance including wetlands and littoral rainforest, where appropriate
- improve beach amenity through beach nourishment, scraping and dune reshaping activities
- maintain visual and recreational amenity through appropriate design and siting of facilities
- propose new or upgraded swimming enclosures, coastal walking tracks, boat launching ramps, pontoons and jetties
- manage the interaction between active and passive recreational users
- manage impacts of recreational uses on waterways including moorings, boat cleaning activities, effluent, fishing line, litter and plastics
- manage the impacts of recreational access and use on beaches, headlands and dunes
- improve the safety of recreational users such as surfers, swimmers, paddlers, boaters and rock fishers
- improve navigation and boating safety, including dredging and upgrading breakwaters and port facilities

- raise public awareness about the safety risks of coastal areas including large waves, rips, strong currents, marine stingers and sharks, and appropriate responses
- create opportunities for enhancing recreational tourism, such as new national surfing reserves, lookouts, walkways, marinas and other facilities.

The CMP may, in consultation with the relevant public authority, recommend the preparation of new or updated plans, or highlight matters which need further investigation by public authorities. This may include recommending the preparation of or revision of boating management plans or plans of management for public lands.

The CMP may propose changes to the management of land by other public authorities when that management has impacts on, or implications for, land managed by council.

The CMP may also identify recommended linkages and opportunities for integration with statewide programs for essential infrastructure, such as roads, ports and sewerage systems.

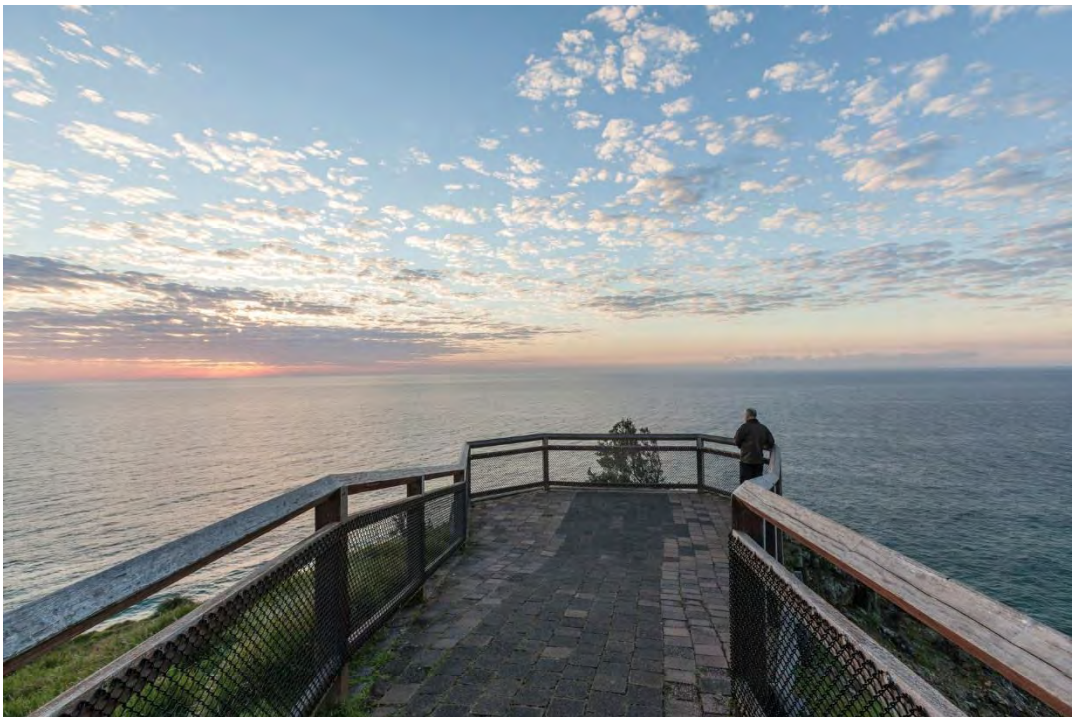

Figure B3.23 Cape Byron headland walk, Byron Bay (Photo: M Vanderveer/OEH)

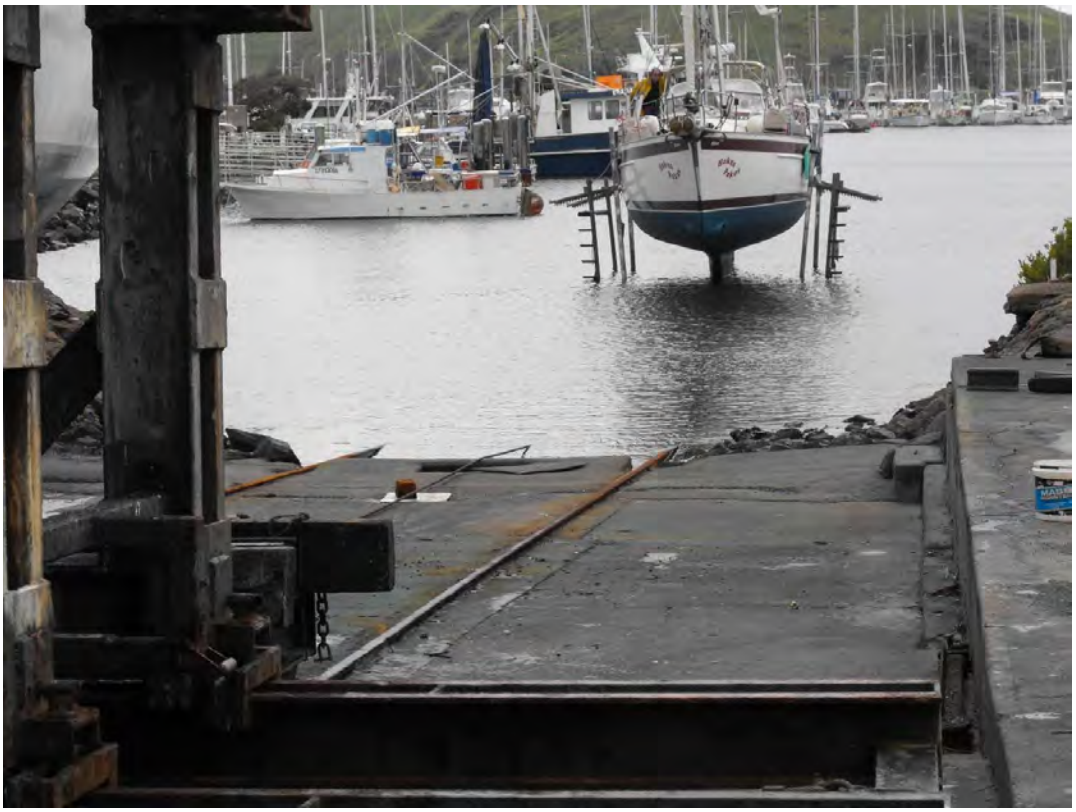

Figure B3.24 Marinas and slipways are regulated by the EPA (Photo: W Wickremeratne/OEH)

3.8 Evaluating management actions

Councils are advised to undertake a structured and transparent evaluation process to select and adopt the most appropriate coastal management actions. This will assist relevant stakeholders to understand the process.

It is recommended that proposed coastal management actions be evaluated in relation to feasibility, viability and acceptability. These evaluation steps would normally be conducted sequentially.

The evaluation of coastal management actions may involve multi-criteria analysis (MCA) or similar methods to evaluate feasibility or acceptability. A range of economic assessment methods (from simple economic assessment to cost-benefit analysis) can be used to determine viability.

Figure B3.25 shows how the staged evaluation combines to help councils identify a program of coastal management actions for their local area.

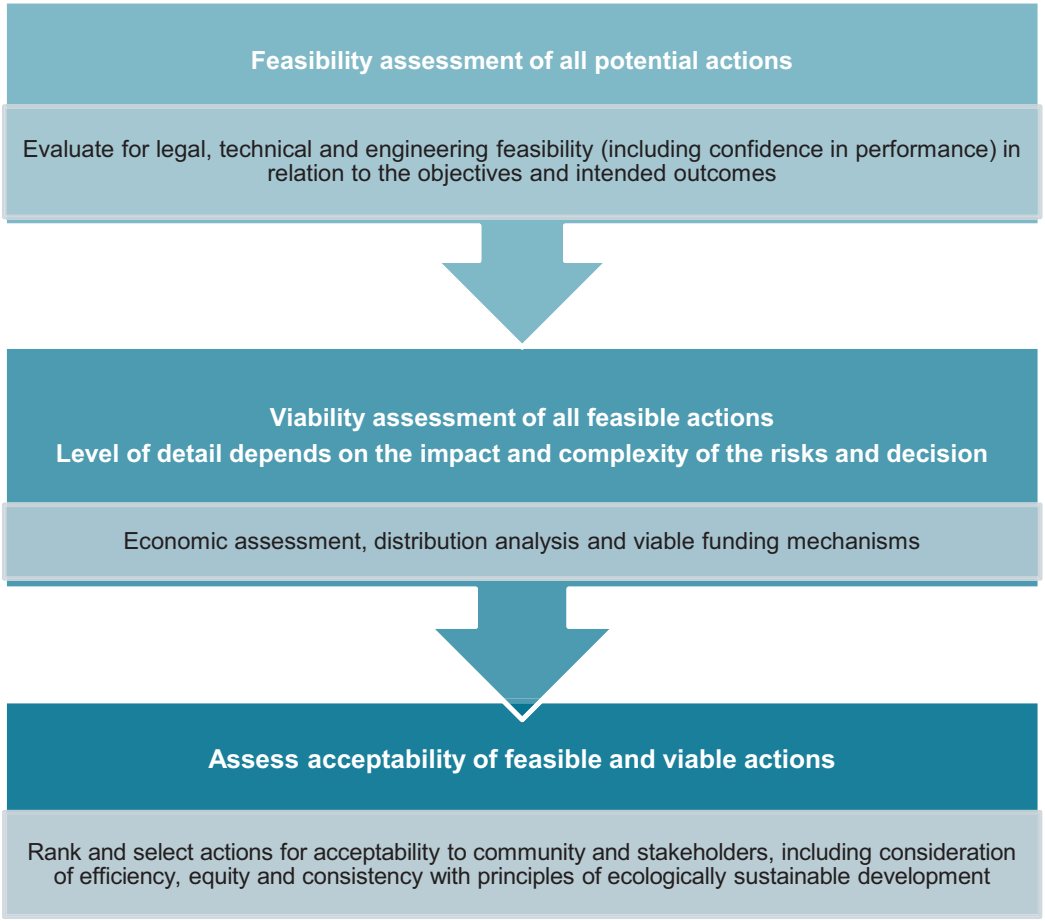

Figure B3.25 Staged option evaluation process

3.8.1 Assessing feasibility

Feasible coastal management actions are those which:

- are consistent with the objects of the CM Act and management objectives of the coastal management areas
- comply with statutory and policy requirements at local, state and Commonwealth levels
- are environmentally acceptable and consistent with Ecologically Sustainable Development (ESD) principles
- are feasible in engineering terms, i.e. a structure can realistically be built, given the local process context
- can address the identified issues, mitigating risks or enhancing opportunities, based on previous experience
- are adaptive and can transition to alternative approaches when circumstances change
- are broadly able to be implemented, in terms of available capacity and capability
- are likely to contribute new knowledge about effective management; for instance, a response that is structured as a carefully controlled trial of new technology.

When evaluating the feasibility of a coastal management action, councils may also consider:

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

It is important to recognise that some actions will create a path dependency that reduces the ability to adapt when certain environmental, social or economic thresholds are exceeded. For example, extensive investment in protect actions over the next decade may limit the ability to transition to alternative adaptation options when the protect pathway is deemed unsustainable. **Section 3.9.1** provides further information on adaptive management.

3.8.2 Evaluating viability through economic assessment

Economic assessment approaches can help decision-makers better understand the socioeconomic implications of adopting different management actions and help them to make choices about which actions will provide net benefits to the community. This information will also assist in developing a business plan and determining cost-sharing arrangements (see **Section 3.10** for further details).

The scope and level of detail included in an economic assessment will be proportionate to the nature and scale of the coastal issue(s) being addressed. Detailed cost-benefit analysis (CBA) is not warranted for projects that are only expected to have minor costs and/or benefits for a very limited number of parties.

Coastal management actions which will operate over relatively long timeframes, including engineering works with long design lives, are likely to affect a range of stakeholders, and

generate potentially large direct and indirect costs and benefits. A detailed CBA for such large-scale or long-lasting actions will determine whether the benefits outweigh the costs.

Figure B3.26 provides guidance for selecting the appropriate level of economic assessment, based on a matrix of risk and complexity. There are three levels of assessment:

- simple economic assessment when the risk, impact and complexity are low
- intermediate level where either risks or complexity are high, data are available or specific issues need more detailed consideration
- CBA when the risks, impacts and complexity are high.

		Complexity	
		Low • Limited number of stakeholders • Little or no quantitative data	**High** • Disagreement or conflicting views among stakeholders • Difficulty defining beneficiaries or apportioning costs • Good quantitative data
Risks and impacts	**Low** • Limited spatial scale • Low risk and low impact	**Simple economic assessment** These assessments ask similar questions as the more complex analysis, but use qualitative analysis and expert opinion rather than quantitative data.	**Intermediate level assessment** These assessments ask the same questions as the more complex analysis, but may use detailed costings.
	High • Addressing high or extreme risks • An option involves major investment (see Treasury Guideline 2017)	**Intermediate level assessment** Monte Carlo modelling or significant social analysis may not be necessary, but some detailed costing, e.g. for maintenance, is required.	**Detailed cost-benefit analysis** This may involve a systematic comparison of all foreseeable costs and benefits and the probability that they will arise over the planning period.

Figure B3.26 Matrix of risk and complexity for selecting the level of economic assessment

It is recommended that councils provide a clear statement that assists the community to understand the benefits of a management response (why it should be done) and any constraints or side effects that would need to be managed.

The economic assessment may assist to identify:

- the cost of the action
- the distribution of costs and benefits of coastal management options to different stakeholders
- any proposed cost-sharing arrangements and funding mechanisms
- whether proposed management actions are affordable.

Consideration of potential benefits and costs includes environmental and social values as well as financial implications. Estimates of social and environmental values such as

ecosystems services can be considered using a range of qualitative and quantitative approaches.

In designing the assessment, an important consideration may be to provide an appropriate level of rigor, transparency and discriminating power to reflect the complexity and impact of the decision to be made. Another important consideration will be the levels of uncertainty and availability of quantitative data.

When undertaking an economic assessment, councils may be required to identify the full capital, operational and ongoing maintenance costs of potential management actions. The value of benefits is to be estimated in dollar terms, were possible.

An analysis of the distribution of the costs and benefits to council, public authorities, stakeholders and the environment is recommended. When undertaking this analysis, an important consideration will be the capacity of beneficiaries to pay when apportioning the costs.

It is also important to determine the viable funding mechanisms that are consistent with their IP&R Resourcing Strategy and any other source of funding. This includes consideration of the timing of the funding to ensure delivery of the action.

Cost-benefit analysis

CBA is an economic assessment approach which can be used to compare options and assist councils to make complex decisions when risks and impacts are high and costs and benefits can be quantified.

A CBA can be used to estimate changes to the economic wellbeing of local and wider communities. A CBA is used to estimate and compare the costs and benefits of implementing a proposed project or management activity with the costs and benefits of a base case, which represents a continuation of current conditions under which the proposed project/policy is not implemented.

CBAs tend to be data-intensive, require higher level technical skills, and may take longer to prepare than the simpler, rules-based economic assessments. However, they provide rigorous, defendable outcomes for complex high-risk decisions.

Where there is uncertainty as to whether the impact or complexity is sufficient to warrant a detailed economic appraisal, councils may seek advice from the Office of Environment and Heritage.

Important considerations in a detailed cost-benefit analysis include:

- the coastal management issues that are being addressed in a CMP
- a socioeconomic profile of the local government area's community
- a profile of the environmental values of the subject area (including amenity and recreational values)
- a base case representing a continuation of current management approaches
- alternative actions for achieving the desired objective
- the key features of the base case and each alternative, and their costs and benefits
- the results of the economic analysis of the base case and alternatives, clearly describing the assumptions used, and showing their estimated net present values (NPVs) and benefit-cost ratios (BCRs)
- conclusions about the preferred option, as demonstrated by the analysis
- a distributional analysis of the allocation of the costs and benefits of the preferred option
- a description of costs and benefits which cannot be quantified, and other material which may inform council's decision-making.

3.8.3 Assessing acceptability and selecting responses

The final step in the evaluation process is to determine which of the feasible and viable coastal management actions are recommended to be included in the CMP. This involves consulting with the community and stakeholders to determine the acceptability of the actions.

Proposed coastal management actions may be assessed in terms of:

- consistency with the objectives of the CM Act and council's long-term strategic direction
- public interest and wider public benefit
- effectiveness in reducing risks and threats
- whether the action is proportional to the level of risk
- sustainability
- potential impacts and their distribution
- value for money and efficient use of resources
- timeliness
- fairness and equity
- community cohesion and resilience.

Transparency, objectivity and clarity are important considerations when designing the assessment framework. The use of techniques such as multi-criteria analysis and paired comparison analysis may complement the economic assessment.

3.9 Linking management responses over time

3.9.1 Adaptive management

An adaptive management approach can be used where an action is required now but there is uncertainty about future conditions including climate change, or disagreement about which action should be taken.

Adaptive management is not the same as trial and error. It is a systematic approach for improving coastal management by learning from the outcomes of previous actions.

Adaptive management recognises explicitly that the coast is a dynamic environment; that uncertainty will vary over time (generally increasing for events that are further into the future); and that agreed goals may also change over time.

It involves monitoring and reviewing the effectiveness of actions against expected performance to increase knowledge and certainty. This will allow councils to refine management responses and maximise environmental, social and economic benefits over time.

Clear communication during the adaptive management process can help reduce resistance and prepare the community for change by linking management decisions to evidence that agreed thresholds have been met.

Effective adaptive management depends on:

- clear definitions of the overall vision, objectives (acknowledging that both may change at some future time) and acceptable outcomes
- specific management actions, with timeframes and measurable performance criteria

- targeted monitoring of trends in environmental condition and of the performance of specific responses, i.e. it is intended to be evidence-based
- clear thresholds and triggers for change (see **Section 3.9.2**).

Adaptive pathways may be specified in advance (e.g. when this threshold is passed council is committed to change management to a predetermined new response), or may be left open and subject to a review when the threshold is approaching.

This approach recognises uncertainty and provides longer-term flexibility. Adaptive approaches require continuity of management responsibility, to enable changes in the risk to be monitored and intervention to occur as triggers are reached.

A more precautionary approach with a one-off intervention may be necessary where it is not possible to adapt with multiple interventions due to technical feasibility or where adaptive management is too complex to administer. **Figure B3.27** outlines the difference between a one-off intervention and an adaptive approach.

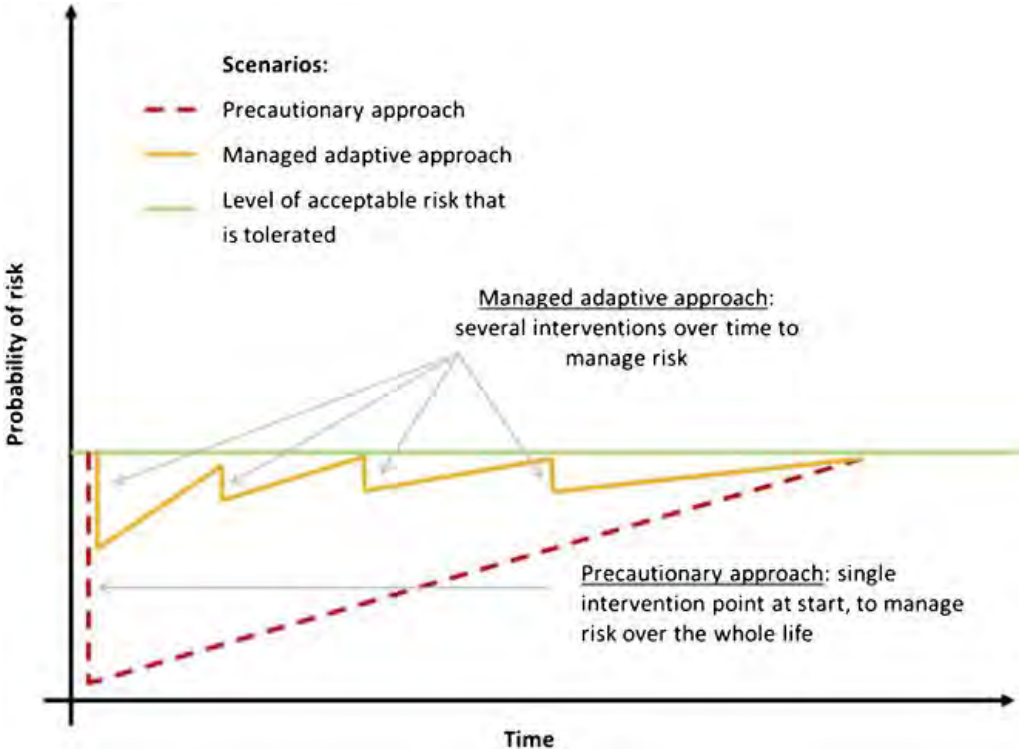

Figure B3.27 Alternative precautionary and managed adaptive approaches to risk-based management (Source: After Defra (2009: 23), used under open access licensing)

It will be important to consider linkages between the CMP and their broader climate change adaptation plans to strengthen community resilience. Community consultation during the preparation of adaptation plans may assist to:

- build goodwill and a collaborative approach
- test values, objectives, feasibility and viability of potential actions
- prepare an agreed schedule of actions and thresholds.

This intensive engagement practice is a key task to incorporate into the council's Delivery Program and Operational Plans.

Important considerations in preparing adaptation plans include:

- increased frequency and timing of inundation of coastal infrastructure utilities
- increased maintenance costs for roads and pavements as they are affected by coastal erosion, elevated groundwater levels or salt water inundation
- uncertainty about the longevity of existing coastal development and appropriate ground levels, floor levels, building design and land use planning for areas that are vulnerable to coastal hazards
- uncertainty about how, and at what cost, safe coastal access will be maintained when access ways (to the shore and along the shore) are impacted by coastal hazards and climate change.

The preparation of a climate change adaptation plan enables communities to make choices about coastal management actions and how they will impact on the local population. This includes the implications for the resilience and viability of the community and community services such as public transport, medical facilities and shops.

3.9.2 Using thresholds and triggers

Thresholds are the point when irreversible change is likely to occur, risks become unacceptable and the current management response will no longer be effective.

An ecological threshold may be a tipping point where irreversible change (decline) occurs to the structure, functioning and resilience of an ecosystem. A physical threshold may be a point where natural defences are no longer effective in managing the risk of coastal erosion.

In a community context, a threshold can be the point where a building becomes uninhabitable due to safety concerns, or a village or small town is no longer viable through functional failure of essential infrastructure, or loss of employment opportunities or population.

A trigger is an incident or occurrence that initiates other events. In the case of decision-making, a trigger is used to indicate when a management response is required and/or an action should be implemented.

When applying an approach that takes uncertainty into account when determining thresholds and triggers, it is important to identify:

- what is natural variability and what is outside the normal range, based on monitoring
- when affected owners or the community will be notified that a change of management may be required
- when to start preparing for a new management response, allowing sufficient lead time for analysis, design, consultation and allocating funding in the Resourcing Strategy and Delivery Program
- when the new management response will be implemented.

Generally, physical rather than time-based triggers are preferable as they are based on actual events rather than uncertain predictions. Triggers can be controversial and community members may have different views about where the trigger should be set, so engagement is necessary to identify an acceptable balance.

Where exceeding a threshold is likely to have significant resourcing implications for councils, it may be important to consider their likely occurrence within the Resourcing Strategy and Delivery Program review cycle.

3.10 Business plan for implementing the CMP

3.10.1 Requirements of the business plan

A business plan will be included in the CMP. This will outline the full cost of the program, cost-sharing arrangements, funding and financing mechanisms and scheduling of implementation.

The information compiled in Stage 3 may include:

- The full capital, operational and maintenance costs of the coastal management program.
- The distribution of costs and benefits of the management program. The distribution analysis may consider council, public authorities, directly affected stakeholders (such as landholders in coastal hazard areas), indirectly affected stakeholders, and the environment.
- How funding and financing for the CMP will be secured for short, medium and longer-term actions, including capital works and ongoing maintenance obligations.
- How the council will work with public authorities, adjacent councils, private landholders and the broader community to manage the costs of investment in coastal issues, scheduling of activities and the delivery of local and regional benefits.

3.10.2 Funding and cost-sharing principles

Beat practice cost-sharing arrangements reflect the benefit derived from coastal management actions, minimise cross-subsidies, and avoid additional burden on taxpayers and ratepayers.

It is important that the equity of cost-sharing arrangements is considered and documented. The mechanisms used to enable cost-sharing will be most acceptable where they are efficient, transparent to the community and relatively easy to understand.

It is recommended that councils consider the following seven principles when recommending the appropriate allocation of costs associated with coastal management actions (**Table B3.1**).

Table B3.1 Cost-sharing principles for coastal management

Principle	Definition
Aligned with local and strategic objectives	Cost-sharing is consistent with the agreed strategic management direction for that part of the coast and consistent with other government objectives at the state and local level.
Reflects benefit derived	Cost-sharing has regard to the beneficiaries of the action and the relative benefits enjoyed by each party. Where only private benefits are derived and the capacity to pay is limited, consideration is given to whether the investment is in the public interest and whether greater public benefit could be derived from (Australian, state or local government) investment in other issues or approaches.
Reflects full capital expenditure and operational expenditure of the option	Where practical to do so, cost-sharing arrangements recover all costs associated with coastal management activities and ensure adequate resources are allocated to enable effective action.
Minimises cross-subsidies	Costs are shared based on direct impacts and at a level that is proportional to the resources devoted to delivering actions.
Encourages efficient costs	The level and structure of costs are based on the most efficient and effective way of delivering actions.
Simple and predictable	The cost-sharing mechanism is simple to administer and monitored against results. It is consistent with public policy directions on expenditure.
Effective implementation	Cost-sharing arrangements are decided in consultation with relevant parties (including other councils, public authorities, private landholders and the community), to be transparent and be reviewed regularly.

3.10.3 Funding contributors

There is likely to be a mix of contributors to the costs of implementing a coastal management program. A distribution analysis may help councils to identify how the benefits of coastal management actions are shared and the capacity of beneficiaries to pay. The range of potential funding contributors could include:

- the broader community
- people who live in the local council area
- property owners who will directly benefit from coastal management actions
- people who use the coast
- stakeholders from outside the council area
- coast-dependant businesses
- councils and public authorities including land managers, asset owners and service providers
- public authorities involved in emergency management
- Commonwealth Government where there are national benefits.

The role of each of these groups in the implementation of a CMP will vary depending on the nature of the coastal management actions proposed and who benefits from those actions. A CMP business plan may also identify the intended and actual contributions.

Funding approaches will vary between CMPs, and councils may need to use a mix of mechanisms to enable cost-sharing and securing of funds from the relevant groups.

A cost-benefit analysis and distributional analysis may assist councils to identify the mix of contributors and determine equitable contributions to be included in the business plan.

3.10.4 Funding and financing options

A range of funding and financing mechanisms are available to enable councils to resource the cost of implementing coastal management actions consistent with agreed cost-sharing arrangements. These include local rates, levies, charges, developer contributions, low-interest loans and grant schemes.

Borrowings are a primary financing mechanism used by councils. Where this is used, the project may be self-sufficient with an adequate income/funding stream to support loan repayments.

Under section 495 of the *Local Government Act 1993*, a council can levy a special rate for meeting the cost of any works, services, facilities or activities provided or undertaken, or proposed to be provided or undertaken, by the council, within the whole or any part of the council's area.

This mechanism may be used by councils in certain circumstances to secure reasonable and proportionate funding from private beneficiaries for the cost of implementing coastal management actions such as constructing, maintaining and repairing coastal protection works.

Councils must consult, and reach an agreement, with public authorities if the CMP recommends any:

- proposed actions or activities to be carried out by that public authority; or
- relates to, affects or impacts on any land or assets owned or managed by that public authority; or
- proposes specific emergency actions, activities or works to be carried out by that public authority under the coastal zone emergency action subplan.

A CMP must not include proposed actions or activities to be carried out by a public authority or relating to any land or other assets owned or managed by a public authority unless the public authority has agreed to the inclusion of those proposed actions or activities in the program.

3.10.5 Other mechanisms to support CMP implementation

Councils are encouraged to consider opportunities to:

- reduce costs by cooperating with councils that have similar requirements, such as major beach nourishment programs
- leverage effort where consistent approaches are required across local government boundaries and/or economies of scale could produce opportunities to reduce costs
- coordinate state and local government programs

- build resilience and mitigate risks, in preference to relying on emergency management actions.

For example, dredging to improve navigation may provide opportunities for local councils and public authorities to work together to identify beneficial reuse of the dredged material such as beach nourishment programs.

Volunteers also make a substantial in-kind contribution to coastal planning and management. Coordinated volunteer programs create opportunities to raise community awareness, undertake citizen science programs, restore degraded habitats and build commitment to sustainable coastal management.

Examples of volunteer programs include beach monitoring, the Witness King Tides photography project and monitoring and restoration programs for estuary water quality, migratory waders, coastal wetlands, dunes and coastal biodiversity.

Figure B3.28 Citizen science is an important tool helping to fill knowledge gaps (Photo: P Robey/OEH)

Figure B3.29 Community conservation volunteers heading from Birchgrove to Goat Island Sydney Harbour National Park (Photo: Rosie Nicolai)

3.11 Moving to Stage 4

At the end of Stage 3, councils will have identified preferred coastal management actions in consultation with stakeholders and the community.

Information documented through Stage 3 of Part B of the manual may include:

- an outline of the methods used to identify proposed coastal management actions
- an overview of all proposed coastal management actions considered and their advantages and disadvantages
- the criteria and process used to evaluate proposed coastal management actions, including any assumptions
- the outcomes of the evaluation and preferred proposed coastal management actions
- priorities, timing and adaptation pathways
- a business plan which includes an economic assessment and the distribution of the costs and benefits.

3.12 Compendium of strategic approaches and management actions

Table B3.2 Strategic approaches and examples of responses for coastal wetlands and littoral rainforests

Broad risk management concept	Strategic approach	Examples of this approach for coastal wetlands and littoral rainforests
Alert – includes low regrets, watch and wait, preparing for change and research to improve knowledge.	This approach is broadly equivalent to maintaining the current management, but also acknowledges the potential for change that will require active intervention once thresholds have been reached.	Monitor changes in water levels, flows or water quality and ecosystem responses in coastal wetlands. Monitor changes in invasive species in coastal wetlands and littoral rainforests. Monitor wetland or rainforest responses to increasing threats and hazards. Regular consultation and information for stakeholders. Preparation within council for change including policy development, defining thresholds for intervention or forward budget planning to set aside funds for expected future intervention and adaptation. Investigate opportunities for new solutions or improved options for sustainable management of emerging or complex threats such as potential impacts of climate change including sea level rise, impacts on species and ecosystem distribution, and opportunities for the migration of mangroves and saltmarsh as water levels rise. Assessment of impact of extreme heat days or changes to storminess on coastal wetland and littoral rainforest communities.
Avoid future impact.	For coastal wetlands and littoral rainforests, this includes recommending retreat of other land uses away from the coastal management area or preventing the expansion of potentially impacting land uses.	Recommend zoning measures, tenure arrangements or removal of barriers that prevent the migration of coastal wetlands or littoral rainforests in response to changing water levels or rainfall/storm patterns. Recommend inclusion of the coastal wetlands or littoral rainforests in a national park or state conservation area. Recommend the creation of and maintenance of buffers and manage them to benefit the connectivity or function of coastal wetlands and littoral rainforests. Recommend the prevention of the expansion of development.
Active intervention – includes accommodate (accept changes to the condition of coastal wetlands and littoral rainforests), protect ecological communities	These responses are all forms of risk mitigation, generally intended to improve the resilience of coastal wetlands and littoral rainforests to the diverse threats, and risks identified in Stage 2.	Recommend the prohibition of certain types of development in the catchment to protect coastal ecosystems. Restore tidal circulation to coastal wetlands. Wetland restoration.

Broad risk management concept	Strategic approach	Examples of this approach for coastal wetlands and littoral rainforests
and processes, retreat, or improve the condition of coastal wetlands and littoral rainforests.	In general, these responses are designed to achieve existing objectives and maintain existing operating models; however, in some cases, the management response will result in directed transformative change.	Manage acid sulfate soils. Change mowing and clearing practice around coastal wetlands. Weed management programs to enhance resilience. Improve fire management. Change stormwater quality or quantity entering a coastal wetland.
Planning for change – or accept change and allow processes and communities to evolve and adapt.	This approach acknowledges that for some coastal wetland and littoral rainforest areas the cost of intervention is very high and the certainty of improved outcomes is low. It allows undirected transformative change of natural systems.	May be used in coastal national parks, allowing shoreline change to progress without intervention.
Emergency response	Plan for occasional large events, hazards or incidents that will require coordinated actions to protect the values and functions of wetlands and littoral rainforests.	Hazards could include extreme heat periods, bushfire, algal blooms, plant diseases, etc.

Table B3.3 Strategic approaches and examples of responses for coastal vulnerability areas

Broad risk management concept	Strategic approach	Examples of this approach for coastal vulnerability areas
Alert – includes low regrets, watch and wait, preparing for change and research to improve knowledge.	Implement strategies that are cost-effective now whether hazards or change occur or not. All risk profiles from very low to extreme, and all existing and future land use contexts, as an adjunct to other approaches. May be the primary response when risks are low. Seldom sufficient in high-risk situations.	Watch (monitor) and review. Maintain and enhance awareness. Community education. Natural defences. Dune management in accordance with the Dune Management Manual. Managing public access. Beach scraping. Public access ways. Riparian management. See **Section 3.5.1**.
Avoid risk through recommending changes to land use planning provisions	Act to reduce future risk, for example: • where moderate to extreme risks are associated with coastal hazards • in greenfield development areas • where there is potential for an escalating long-term risk profile if avoidance actions are not implemented.	Land subject to threats, and not currently developed, may be maintained in open space. Recommending changes to zoning controls and location of new assets outside areas that are, or are expected to be, (at specified probability) exposed to coastal hazards. Strategic planning to ensure high impact or intensive recreational use to avoid sensitive areas. See **Section 3.5.2**.

Broad risk management concept	Strategic approach	Examples of this approach for coastal vulnerability areas
Active intervention	Accommodate risk – recommended actions to reduce immediate to medium-term consequences, maintaining the current land use and settlement structure. Recommend changes to zoning to facilitate sustainable and adaptive coastal management. Recommend structural protection works and actions that aim to reduce likelihood of risk now, by protecting the relevant parts of the coastal vulnerability area. This may be achieved by placing a physical barrier between the asset and coastal processes, subject to the requirements of sections 27 and 28 of the CM Act.	Short and medium-term risks are tolerable. Recommendation of landfilling, house raising and flood proofing in the case of coastal inundation where appropriate. Recommend development controls for infill and redevelopment of existing development areas, and recommend need for any notifications on land titles. Recommend tenure arrangements that do not sterilise land use in the short to medium-term. Moderate to extreme risks, such as localities affected by hazards, but with regionally significant assets, assets that cannot reasonably be relocated or high-value assets where the cost of protection can be justified and where the social and environmental impacts from protection, may be managed. Examples may include recommending beach nourishment, seawalls, revetments and groynes. See **Section 3.5.3**.
Planning for change – reduce risk through managed retreat and realignment.	Recommended action to reduce consequences, for example: • immediate to medium-term risks are not tolerable or acceptable, with diverse important social or environmental values that need to be maintained for locations with only limited or local-scale development, where coastal protection works cannot be justified in cost-benefit terms and accommodation options through redevelopment are not sufficient to reduce risk.	Recommend removing existing assets from vulnerable areas. Recommend the prevention of further development and/or down-zoning to ensure more appropriate forms of land use. See **Section 3.5.4**.
Emergency response	To control risk until management strategies have been implemented or to manage the residual risk when all viable strategies have been implemented. Aim to protect public safety and to ensure that ad hoc protection does not pose a threat to safety or detract from beach amenity or access.	Emergency response is aimed at protecting public safety including people using public spaces and those whose properties are impacted by coastal hazards. It is primarily the responsibility of emergency services. The role of councils is to prepare a coastal zone emergency action subplan. See **Section 3.5.5**.

Table B3.4 Coastal protection options relating to different coastal hazards

Hazard	Coastal protection options
Beach erosion	• Maintain natural defence processes on beaches, dunes and foreshores, including beach scraping (if beach scraping is proposed consultation with land managers such as the National Parks and Wildlife Service

Hazard	Coastal protection options
	(NPWS) or Department of Industry – Lands (DI – Lands) will be required). • Maintain coastal wetlands, reed beds, mangroves and riparian vegetation on estuary foreshores to buffer against wave impacts on foreshore stability and amenity. • Sand relocation using sources such as beneficial reuse of sand dredged from the entrance of an estuary or coastal lake. • Beach nourishment using terrestrial or offshore sand sources. • Seawalls and revetments. • Groynes. • Offshore reefs. • Sand bypassing and back-passing systems.
Shoreline recession	• Maintain natural defence processes on beaches, dunes and foreshores, including beach scraping (if beach scraping is proposed consultation with land managers such as the NPWS or DI – Lands will be required). • Sand relocation using sources such as beneficial reuse of sand dredged from the entrance of an estuary or coastal lake. • Beach nourishment using terrestrial or offshore sand sources. • Seawalls and revetments. • Groynes. • Sand bypassing and back-passing systems.
Coastal lake or watercourse entrance instability	• Entrance training (rock training walls) to prevent migration. • Berm management (raising or lowering), using reshaped sand (sometimes obtained from dredging of the bar). See also coastal environment areas for information about the interaction between entrance condition and the health of coastal lakes, including the importance of preparing an entrance management plan for coastal lakes which close intermittently, and linking entrance management to other measures which can mitigate impacts such as flooding.
Coastal inundation	• Dune reshaping and nourishment to raise crest height. • A seawall or revetment may be designed with a crest height that limits the likelihood of wave overtopping and therefore is also likely to reduce consequences by limiting flow velocities or depths.
Coastal cliff or slope instability	• Maintain or restore coastal vegetation on poorly consolidated materials. • Drainage works. • Shot-creting, rock bolting and catch fences. • Remove unstable materials.
Tidal inundation	• Maintain coastal wetlands, reed beds, mangroves and riparian vegetation on estuary foreshores to buffer against wave impacts on foreshore stability and amenity. • Foreshore levees or other reshaping. • Filling of land. • Floodplain drains and floodgates on stormwater drains and small coastal creeks. • In limited circumstances, consider dredging entrance areas and deltas.
Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.	• Foreshore levees or other reshaping. • Seawall or revetment. • Cobble foreshores.

Table B3.5 Strategic approaches and examples of responses for coastal environment areas

Broad risk management concept	Strategic approach	Examples of this approach for coastal environment areas
Alert – wait and see, prepare for change and research to improve knowledge.	Suitable for areas that are in good condition. Coastal land or waters that have high biodiversity conservation value may be managed to protect and enhance coastal biodiversity values. The alert approach acknowledges the potential for change, and that more active intervention may be required. Apply best practice solutions, monitor and prepare for change.	Recommend revisions to zoning. Recommend the location of new development outside the catchments of coastal lakes and estuaries that are particularly vulnerable to elevated sediment or nutrient loads; or place strict controls on water quality and quantity discharged from development in these catchments. Water sensitive urban design in new and redevelopment areas. In some cases, consider and recommend if appropriate the transfer of small parcels of council land to the management of NPWS or a state conservation area, to enhance connectivity, or to protect a specific habitat. Monitoring and evaluation of condition indicators, for instance using report cards. Consider actions to support: • meeting targets in Local Lands Services (LLS) strategies • water quality objectives in the NSW Oyster Industry Sustainable Aquaculture Strategy. Set standards for water quality where catchment flows enter the estuary or coastal lake and require new development to demonstrate that these standards can be achieved and maintained. Set thresholds and triggers for more active intervention. Conduct stakeholder and community awareness and knowledge enhancement programs.
Avoid future impacts on coastal environment areas, and create opportunities.	For coastal environmental areas, this includes a wide range of measures such as retreat of other land uses away from the coastal management area or preventing the expansion of potentially impacting land uses.	To help mitigate longer-term risks associated with climate change, councils may identify land that is required for the migration of important coastal ecological communities, such as foredunes and saltmarsh around estuaries, as water levels rise. They may consider and recommend changes to land tenure, where possible, and recommend changes to current zoning as necessary to allow migration or transgression of coastal morphological features. Consider and recommend changes to current zones (and consider whether it is more appropriate to use E zones or W1 or W2 zones). Consider and recommend changes to development controls in the Development Control Plan (DCP) to lessen the impact of urban expansion into coastal environment areas and the ongoing impacts of urban

Broad risk management concept	Strategic approach	Examples of this approach for coastal environment areas
		development and intensive recreational use on coastal environment areas. Studies completed in Stage 2 of Part B of the manual may identify new sites where the coastal values recommend changes to the zoning or the DCP. Recreational access controls and management to avoid impacts on Endangered Ecological Communities (EEC) and other ecological communities in certain circumstances.
Active intervention, including accommodate, protect, retreat from and improve coastal environment areas.	These responses are all forms of threat and risk mitigation, generally intended to improve the resilience of coastal environment areas to the diverse pressures, threats, vulnerabilities and risks identified in Stage 2. A wide range of measures may be recommended to mitigate medium to high risks, depending on the specific type of coastal environment area and the specific risks to be managed. Active intervention may be recommended to maintain existing values, objectives, systems and models, or to support transformation of a natural landscape when pressures and risks cannot be mitigated within the existing model.	Recommending retrofitting improved stormwater treatment and drainage controls such as opportunities for constructed wetlands and sediment traps to address legacy issues from existing development. Riparian and foreshore rehabilitation and protection (e.g. buffer areas). Improved effluent management (e.g. sewage treatment plants, dairy effluent). Protection of seagrass through regulation of mooring design and location. Intermittently closed and open coastal lake or lagoon (ICOLL) entrance management plans and triggers for opening. Incorporation of habitat features into existing or proposed seawalls. Rationalising uncontrolled public access. Recommending managed retreat of elements of the coastal environment area can also be used when land uses are having an unacceptable impact on the condition and system integrity of a coastal wetlands and littoral rainforests area or a coastal environment area. In the short-term, this could include recommended actions such as identifying a perimeter area, not cultivating a riparian area, or removing livestock from a riparian area or coastal floodplain.
Planning for change – allow trends and changes to take their course with minimal additional intervention.	This approach acknowledges that for some areas the cost of intervention is high and the certainty of outcomes is low. The response involves allowing a transformation of the coastal environment area to take place, with limited control.	Where coastal environment areas are severely degraded and cannot be rehabilitated without significant impacts on resources or other values. On dynamic and ambulatory shorelines, allowing ecological communities and functions to adapt.
Emergency response	Manage residual risks and prepare for occasional large/extreme events which are difficult to predict. May include coordinated, temporary works to protect important features, habitats and communities.	Examples of emergencies that may impact on coastal environment areas are oil spills, algal blooms, bushfires, intense storms/tornadoes, landslips and tsunami.

Table B3.6 Strategic approaches and examples of responses for coastal use areas

Broad risk management concept	Strategic approach	Examples of this approach for coastal use areas
Alert – includes wait and see, preparing for change and research to improve knowledge.	This approach acknowledges the potential for change that will require active intervention.	Establish the social, economic and cultural value of the coast, including identifying Aboriginal and other cultural heritage assets. Monitor the safety of, and community satisfaction with, coastal access. This includes the impact of urban and transport design on coastal accessibility and amenity; locations of surf clubs in relation to changing coastal use patterns; and the resilience of foreshore parks to demand and environmental changes. Monitor patterns of coastal access and use in relation to population growth and changing regional access frameworks (such as new highway links). Audit the implementation of coastal design guidelines and principles. Education and awareness activities for coastal heritage and scenic values.
Avoid future impact.	This approach recognises the need to ensure future development does not adversely affect amenity, cultural and built heritage, or limit opportunities for access and use of the coastal use area.	Apply the coastal design guidelines for all new development. Recommend changes to development controls and zoning and consider use of notifications such as s. 10.7 planning certificates. Consider the value of redevelopment of coastal areas to reduce risks associated with coastal hazards, and enhance or restore scenic, environmental or social values.
Active intervention – includes responses that enhance opportunities for balanced and sustainable use of the coast for urban uses, open space, conservation, recreation and tourism. It also includes responses that address existing threats, hazards, issues and vulnerabilities to improve the design of coastal development, and reduce pressures on recreational and amenity assets.	These responses are intended to improve the resilience of the coastal use areas to the risks identified in Stage 2, and to enhance opportunities, particularly for safe public access to beaches and headlands. Ensure responses are aligned with Crown land management processes. Encourage sustainable development at locations highly unlikely to be adversely affected by coastal processes and hazards.	Actions to maintain and enhance access, use and amenity of the coastal use area including recommending changes to LEPs and DCPs. Identification of inappropriate existing development that limits public access, detracts from public amenity such as by overshadowing or wind funnelling, or development that does not take account of the *Coastal Design Guidelines for NSW* (2003). Recommendations to protect Aboriginal and historic heritage sites or places. Recommendation of maintenance or restoration of values of a coastal Aboriginal cultural landscape that supports and enhances the continuing practice of cultural activities, teaching and knowledge transfer. Recommendations to redesign water management in coastal urban areas, enhancing the sustainability of water

Broad risk management concept	Strategic approach	Examples of this approach for coastal use areas
		supplies and reducing pressures on coastal waterways. Recommendations to address risks to the safety of people working in or enjoying recreation in the coastal landscape. Recommendations that enhance opportunities to enjoy the coastal amenity such as walkways around headlands, boardwalks through coastal wetlands and promenades behind seawalls. Recommendations to enhance recreation and commercial opportunities for better use and enjoyment of the coast can be encouraged. Consideration of appropriateness of commercial activities such as cafes, outlets that service beach users and parking that can provide the rental income necessary to support maintenance, operation and upgrading of the public amenity and enjoyment of the beach.
Planning for change	Consider changes to settlement patterns to accommodate increased population and new economic activity. This may include changes to the nature, intensity and character of development. This approach acknowledges that for some coastal use areas the costs of intervention and new developments are very high and the certainty of improved outcomes is low.	Allow shoreline change to progress without intervention as part of a dynamic landscape. May recommend: • relocation of existing development, infrastructure and services • changes to zoning • remediation of sites • support for communities that are disrupted by change.
Emergency response	Coastal emergencies on coastal use areas are likely to be associated with the overlap of the use area and vulnerability area, so include the impacts of extreme events – winds, water levels and waves, on built assets and public safety.	Will generally involve recommendation of control of access to affected areas; assistance for affected landholders; works to maintain the function of essential assets and infrastructure. See also the coastal vulnerability area and CZEAS.


Our future on the coast
NSW Coastal Management Manual Part B:
Stage 4 – Prepare, exhibit, finalise, certify
and adopt a coastal management program
NSW
GOVERNMENT

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Prepare, exhibit, finalise, certify and adopt a coastal management program

In Stage 4, guidance is provided to councils about:

- preparing a coastal management program (CMP)
- exhibiting the draft CMP and any related planning proposal
- reviewing and adopting the draft CMP
- submitting the draft CMP to the Minister for certification
- publishing the certified CMP in the Gazette.

4.1. Overview of Stage 4

The following sections of the *Coastal Management Act 2016* and associated mandatory requirements from Part A are most relevant to this stage

Section 15 Matters to be dealt with in coastal management program.

Section 16 Consultation.

Section 17 Adoption, certification and gazettal of a coastal management program.

Section 18 Review, amendment and replacement of coastal management programs.

Section 19 Availability of coastal management programs,

Stage 4 involves the preparation, exhibition and submission of a draft coastal management program (CMP) to the Minister for certification.

Exhibition of the draft CMP enables council to confirm the outcomes of collaboration with the community and stakeholders about what coastal management issues are being addressed, what actions are proposed and the rationale for selecting those options. It provides a further opportunity for community involvement.

It is recommended that the draft CMP is submitted to the Office of Environment and Heritage (OEH) for review both before public exhibition and after community and stakeholder input has been incorporated. The draft CMP is then finalised and adopted as a draft by the council prior to forwarding to the Minister for certification.

When the draft CMP is submitted for certification, the Minister may seek advice from the NSW Coastal Council before deciding whether to certify the CMP. Once certified, the CMP must be published in the Gazette by the local council.

Figure B4.1 shows the recommended steps a council may undertake when preparing, exhibiting and finalising a CMP.

NSW Coastal Management Manual Part B: Stage 4

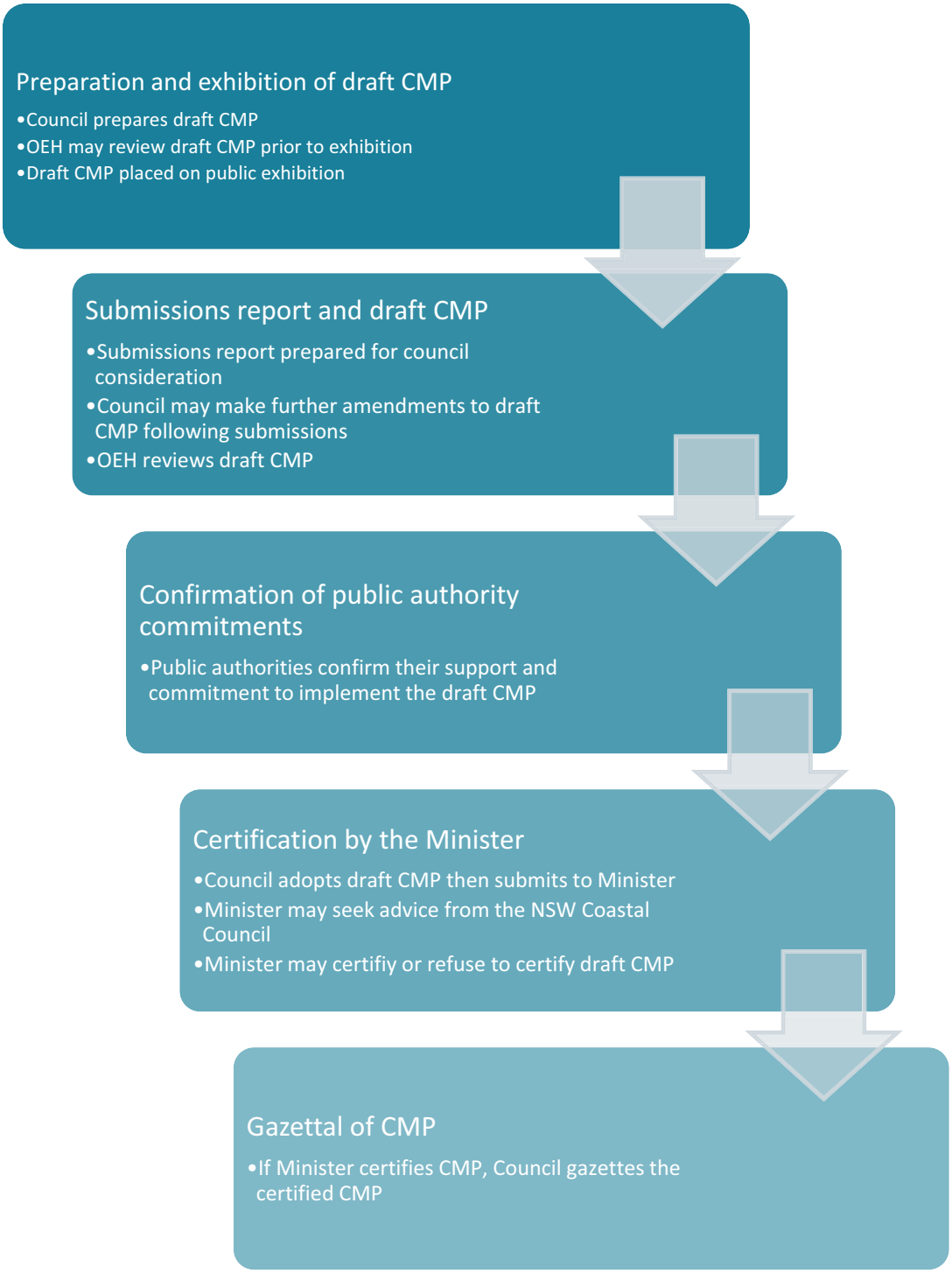

Figure B4.1 Finalising the CMP

4.2. Components of a CMP

The CMP is a clear and succinct statement of proposed coastal management actions undertaken to meet state, regional and local coastal management objectives.

The CMP outlines how actions will be implemented through the Integrated Planning and Reporting (IP&R) framework and the land-use planning system (including relevant information about timing, costs and responsibilities).

The CMP should contain sufficient information to stand alone as a framework for sustainable management of the coastal zone for the coming 10 years. It may also highlight any uncertainties about change and foreshadow longer-term issues.

The components of the CMP are outlined in **Figure B4.2**, with further information in **Sections 4.2.1 – 4.2.9**.

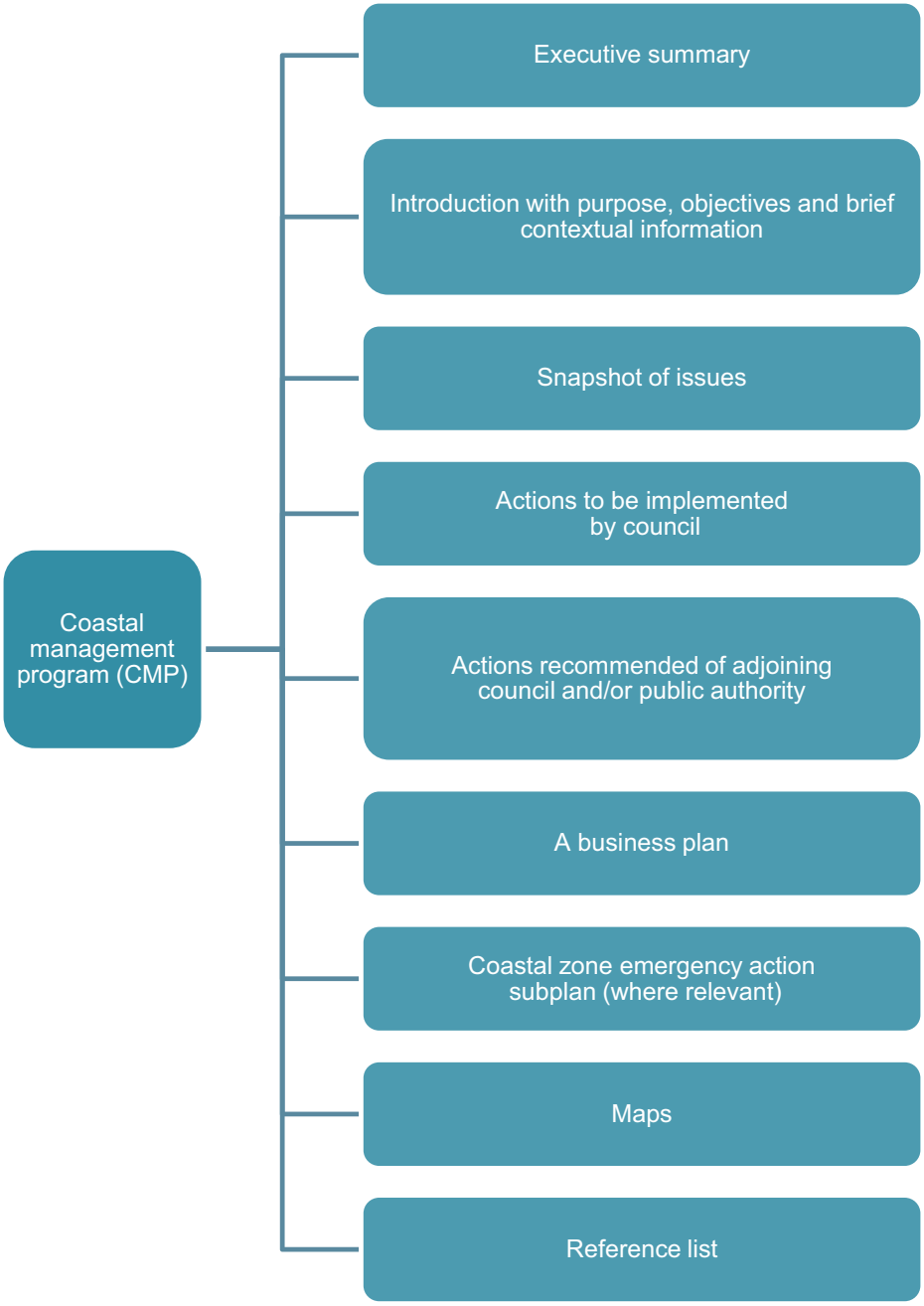

Figure B4.2 Recommended components of the CMP

4.2.1 Executive summary

The executive summary of the CMP provides an overview of the CMP.

It outlines the council's proposed framework for a strategic and integrated approach to managing short, medium and long-term coastal management issues.

The executive summary provides a clear statement of council's priorities over the next 10 years. It also signals council's longer-term strategy for the coast, consistent with the objects and management objectives in the *Coastal Management Act 2016* (CM Act).

4.2.2 Introduction

It is recommended that the introduction provides an overview of council's vision, objectives and strategic direction for the relevant coastal management areas, and how these align with the state's objectives for the NSW coastal zone under the CM Act.

It provides an overview of the context, purpose and scope of the CMP. It also includes a location map showing the relevant coastal management areas included in the CMP, the coastal sediment compartment context, local council boundaries and natural and socioeconomic features.

The introduction would benefit from being supported by an overview of key stakeholders, their interests and issues, and how they have been consulted. Key stakeholders may include public authorities, other councils, the local Aboriginal community, businesses, residents, rate payers, community groups and visitors.

4.2.3 A snapshot of issues

The snapshot provides a summary of the key coastal processes, coastal hazards, threats to coastal ecosystems and values, and priority coastal management issues for the CMP. This information may be presented graphically or in tables, with detailed information provided in the supporting documents.

It outlines how the CMP was prepared and what planning horizons, scenarios and risk criteria have been used when identifying coastal management issues, assessing risks and evaluating actions and the rationale for their selection. It also highlights any significant changes in issues since the last CMP was adopted.

The snapshot of issues outlines how the CMP has considered matters such as:

- current and future risks, at timeframes of immediate, 20 years, 50 years, 100 years and beyond and if appropriate, potentially very large, low probability events
- the effects of climate change
- the local and regional-scale effects of coastal processes
- the ambulatory and dynamic nature of the shoreline
- population growth and demographic changes
- projected use of the coastal zone.

The snapshot identifies the coastal management issues for each of the coastal management areas recognising that some issues may affect more than one area.

For a coastal wetlands and littoral rainforests area, the snapshot may identify the current and future threats to the biodiversity, resilience and integrity of these ecosystems and ecological health. It may highlight degraded areas and locations threatened by land-use pressures and climate change.

For coastal vulnerability areas, the snapshot may outline the current and future risks from coastal hazards, including public safety and risk to life. It highlights the properties and critical infrastructure that are vulnerable to coastal hazards. It may also outline issues and threats to the presence of beaches, dunes, natural features, public access, use and amenity.

For coastal environment areas, the snapshot may identify any threats and risks to coastal ecosystems, biological diversity, ecosystem integrity, water quality and estuary health. It may also outline threats to beaches, dunes, natural features, public access, use and amenity.

For coastal use areas, the snapshot may outline threats and risks to the scenic, social and cultural values of the coast including expected population growth and development pressures.

4.2.4 Actions to be implemented by the local council

The CMP outlines what proposed coastal management actions will be implemented by the council and how they address coastal management issues in an integrated and strategic manner. It may identify how actions have been prioritised in terms of their feasibility, viability and acceptability.

The CMP provides an overview of how and when coastal management actions are to be implemented, whether there are any priorities, and the allocation of roles and responsibilities to achieve them (consistent with the relevant legislation). It distinguishes between actions to be implemented under the IP&R framework and the land-use planning system.

As a minimum, a CMP includes a list or table of coastal management actions that are intended to be implemented by council in relation to any existing or proposed coastal management areas.

It also includes coastal management actions that are intended to be implemented by council through the preparation, development and review of, the plans and strategies, programs and reports to which Part 2 of the *Local Government Act 1993* applies (referred to in this document as the IP&R framework) and the indicative time-frame for this.

Actions to be implemented by councils as part of the IP&R framework may include policies, programs, plans or works relating to coastal infrastructure, asset management, public access, amenity, community awareness, monitoring, reporting, research and environmental protection and restoration. It is recommended that actions be consistent with the level of service expected by the local community.

The CMP may present schedules of proposed coastal management actions in a similar format to the IP&R framework, highlighting actions to be delivered in the Operational Plan and Delivery Program. Tables that show location, issue, actions, priority, budgets, responsibilities and timeframes may help in presenting this information.

The scheduling of coastal management actions may identify short, medium and long-term actions. It may also highlight actions that are linked and contingent on the implementation of other actions.

The CMP may identify ongoing programs and commitments for maintenance or replacement of assets that may extend beyond the review timeframes for both the IP&R framework and the CMP.

A CMP will need to include a list or table of proposed coastal management actions that are intended to be implemented by council, as far as this relates to their statutory functions, and could include the preparation of planning proposals and development control plans under the *Environmental Planning and Assessment Act 1979* (EP&A Act), and an indicative time-frame for this implementation.

Coastal management actions to be implemented by councils may include working on redefining and revising mapping of existing coastal management areas.

Councils may prepare draft maps of proposed new coastal vulnerability areas, for example, and supply this information to support the preparation of a planning proposal that may in turn amend the State Environmental Planning Policy (Coastal Management) 2017 (CM SEPP) to identify that area as a coastal vulnerability area. Please note that such a planning proposal must not be made without the recommendation of the Minister administering the CM Act.

Where a council, or adjoining councils, are proposing to amend one or more coastal management area map, separate planning proposals may be prepared.

Section 3.33 (2) of the EP&A Act outlines the components of a planning proposal. These are summarised in **Table B4.1**. Further guidance on the information required to prepare planning proposals is included in *Planning Proposals – A guide to preparing planning proposals,* NSW Department of Planning and Environment, 2016 (issued under section 3.33(3) of the EP&A Act).

In some circumstances, two or more adjoining local councils may need to submit planning proposals simultaneously, to provide for a consistent approach across the council boundary.

Table B4.1 Summary of components of a planning proposal

Requirement	Where this information is available
Statement of the objectives and intended outcomes of the proposed instrument, in this case, a new or revised map of a catchment management area (CMA).	Stage 1 and Stage 4 of Part B of the Manual will provide information about the objectives and outcomes.
Explanation of the provisions that are to be included in the proposed instrument.	The planning proposal will amend the extent of a coastal management area.
The justification for those objectives, outcomes and provisions and the process for their implementation (including whether the proposed instrument will give effect to the local strategic planning statement of the council of the area and will comply with relevant directions under section 9.1 of the EP&A Act).	Stage 1 will provide the justification for the objectives, which are aligned with the relevant community strategic plan, the CM Act and other relevant regional plans.
Maps containing sufficient detail to indicate the substantive effect of the proposed instrument, including the area to which it applies.	Stage 2 and Stage 3 will provide information about how to map the area to which the planning proposal applies.
Details of the community consultation to be undertaken before the making of the planning proposal.	Community engagement should occur in all stages of the preparation of a CMP. Councils should ensure that consultation during Stage 4 meets the requirements of the Gateway determination, particularly in relation to consultation.

When defining the extent of any proposed coastal vulnerability area, councils may consider:

- the results of coastal hazard studies for a range of scenarios, including hazard types, probabilities and timeframes
- risk analysis and risk evaluation for assets affected by coastal hazards
- the council's tolerance of risk, as established through consultation with their community

- advice provided by the NSW Coastal Council on the appropriate scope and scenarios to be considered in hazard studies (during Stage 1 or Stage 2 of the preparation of the CMP).

A CMP may recommend that land be identified as a coastal vulnerability area within the council's local government area, and indicate whether any beach erosion, coastal inundation or cliff instability is occurring on that land, and if so, confirm that a coastal zone emergency action subplan has been or will be prepared.

The CMP also outlines the monitoring, review and reporting that needs to be implemented by the council or public authorities, developed in consultation and with the agreement of those authorities. Performance targets and indicators should be consistent with those developed for the council's community strategic plan, but additional performance targets and indicators may also be used. Stage 5 of the manual provides further information about monitoring and reporting requirements for a CMP.

4.2.5 Actions to be undertaken by public authorities

Councils often share responsibility for implementing and resourcing actions in the coastal zone with other councils and public authorities. The CM Act provides for public authorities to have regard to CMPs to the extent that they are relevant to their function; and to CMPs and the manual and the objects of the CM Act when preparing, developing and reviewing any plans of management they may be required to produce.

A CMP may also include a list or table of proposed coastal management actions or activities that are intended to be implemented by public authorities and must indicate that their agreement for the inclusion of these actions or activities has been obtained (including adjoining councils where relevant).

A CMP may only identify proposed coastal management actions or activities to be carried out by a public authority, or relating to any land or other assets owned or managed by a public authority, if the public authority has agreed to the inclusion of those proposed actions or activities in the CMP. It is important that councils engage with public authorities early about these actions, and at least before including them in the draft CMP.

Examples of coastal management actions which may be included in a CMP, which may be carried out by a public authority, and may be integrated with coastal management actions by councils, include:

- construction, upgrade or repair of major infrastructure such as entrance breakwaters and ports
- dredging programs to maintain safe navigation access or to provide sand which can be used for beach nourishment
- construction or upgrade of water supply and wastewater treatment systems, including ensuring critical infrastructure is located outside a coastal vulnerability area and managing discharges to coastal waterways
- development of tourism infrastructure
- managing access through Crown reserves or national parks
- joint programs to manage invasive species, waste dumping or pollution sources
- emergency response actions for coastal hazards
- preparation of a plan of management for Crown reserve lands or protected lands (such as nature reserve or national park), consistent with their gazetted purposes
- community engagement, awareness and education programs
- preparation of a boating management plan or mooring management plan for an estuary
- development or upgrade of boating facilities such as ramps, pontoons and wharves

- preparation of mangrove or saltmarsh management plans or plans for marine reserves
- determination of claims under the *Aboriginal Land Rights Act 1983* or Native Title over coastal land, including co-management proposals
- proposed changes to land tenure including rationalising complex boundaries and review of water boundaries
- proposals to update the mapping of a coastal management area that crosses council boundaries
- proposals by public authorities to rezone land in preparation for disposal and development.

The CMP may include details indicating how and when these actions should be implemented and any sequencing or pathways for linked actions. It may identify any monitoring and reporting of actions and outcomes that may be carried out by a public authority, with the intention that they are aligned with the monitoring and reporting conducted by the council.

4.2.6 A business plan

As a minimum, a CMP includes a business plan outlining the key components of the funding strategy, including the cost of proposed coastal management actions, proposed cost-sharing arrangements and other viable funding mechanisms.

As a minimum, the business plan demonstrates viable funding mechanisms for proposed coastal management actions. The business plan needs to identify:

- the full capital, operational and maintenance costs, and timing, of coastal management actions
- proposed cost-sharing arrangements and other viable funding mechanisms to ensure the potential to deliver outcomes consistent with the objects of the CM Act
- the distribution of costs and benefits of coastal management actions.

In the business plan, councils may also demonstrate:

- That adequate resources are identified in council's long-term financial planning, including its asset management plan, to implement short, medium and long-term actions that are the council's responsibility.
- How council will work with public authorities, adjacent councils, private landholders and the broader community to try to achieve secure fair and equitable funding to implement coastal management actions.

The business plan may also highlight any potential contingent liabilities if the CMP were to be varied or not implemented as planned. For example, a contingent liability may arise when a council issues development consents that assume continuing maintenance of coastal protection works such as a seawall or ongoing beach nourishment. This ongoing maintenance could be the responsibility of the council, a public authority or a private landholder, or all three of these.

The protection offered to development by a structure or by beach nourishment will be reduced if the work is not maintained as intended. Reduced maintenance of coastal protection works could increase risks to approved development.

4.2.7 A coastal zone emergency action subplan

The CMP must include a coastal zone emergency action subplan (CZEAS), where the council's local government area contains land within coastal vulnerability area and beach erosion, coastal inundation or cliff instability is occurring on that land.

The CZEAS should include:

- a definition of coastal emergencies
- the roles and responsibilities of public authorities, including council, in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability, where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event
- triggers for emergency response actions
- a clear statement of how council should and should not respond
- the roles and responsibilities for the carrying out of any works for the protection of property affected or likely to be affected by beach erosions, coastal inundation or cliff instability
- actions to be undertaken in the prevention, preparation response and recovery phases.

4.2.8 Mapping

As a minimum, a CMP includes a map (or maps) of the relevant coastal management areas, and any proposed new and/or amended coastal management areas.

These maps may also identify areas exposed to current and future risk from coastal hazards, any proposed new coastal vulnerability areas, or changes to existing ones, and any proposed new (or amendments of) existing maps of the other coastal management areas.

A CMP may also include maps covering adjoining local council areas where cross boundary management is required to address issues such as regional-scale sediment compartment processes, or where an estuary or wetland and its catchment straddles a council boundary.

The starting point for mapping of coastal management areas should be the existing coastal management area maps under the CM SEPP. Fact sheets provide information about the criteria used to determine the boundaries of coastal management areas.

The CMP may also include a map (or maps) of proposed changes to the boundaries of the coastal management areas (see **Section 4.2.4**) highlighting where changes to these current coastal management areas are proposed.

It is recommended that maps be at an appropriate scale, accessible and readily understood by the affected local communities. Councils are encouraged to consult early in the process with the Department of Planning and Environment about any technical requirements for these maps.

4.2.9 Reference list

A CMP includes a list of any additional studies and maps relied on in the preparation of the CMP, and a statement as to how the public can access any of the listed documents (see **Section 4.3**).

4.3. Supporting documentation

Supporting documents may include technical studies and analysis that have been considered during the preparation of a CMP. The nature of the supporting documents will depend on the scope and complexity of coastal issues in the local council area.

The supporting documents are not part of the certified CMP, however, they should be available electronically on the council's website and as hard copies on request. Councils may choose to make hard copies of supporting documents available through their libraries.

Supporting documents may include:

- a scoping study from Stage 1
- a community engagement strategy
- any detailed studies relating to the coastal management areas that have been undertaken in Stage 2 to fill information gaps identified in the scoping study
- reports associated with the evaluation of management options such as an economic evaluation, cost benefit analysis or distributional analysis
- the outcomes of any community engagement and consultation activities.

4.4. Consultation during the preparation of the draft CMP

Consultation is required under section 16 of the CM Act. This may include consultation with:

- directly affected landholders or residents, especially if the distribution analysis indicates that they may contribute to funding to implement coastal management actions
- directly affected landholders or residents who occupy land which may be affected by recommended changes to coastal management area maps
- the broader community of the regional area, not just the local community.

4.5. Exhibiting the draft CMP

It is a mandatory requirement of this manual that a draft CMP be exhibited for a period of not less than 28 calendar days.

If the draft CMP is subject to substantial changes after the exhibition period, it is recommended that the CMP be re-exhibited for an additional period of not less than 28 days.

When exhibiting a draft CMP, councils may also provide:

- additional opportunities for stakeholders to obtain information about the draft CMP and provide feedback
- clear information about how feedback will be used in finalising the draft CMP.

4.5.1. Submissions report

Councils may prepare a submissions report that documents issues raised during the exhibition period. The report may include details on the number of submissions, sources of submissions (by stakeholder, locality and issue) and how any concerns that have been

raised will be addressed in the draft CMP. The submissions report may include the results of consultation with adjoining councils and public authorities.

4.5.2. Final draft CMP

Council's final draft CMP may incorporate any changes necessary to accommodate the feedback received during the exhibition process. Council should consult with OEH about the final draft CMP to ensure consistency with the state's requirements before it is considered for adoption by council and submitted to the Minister for certification.

4.6. Certification of the CMP

Councils may adopt a draft CMP and submit it to the Minister for certification. The Minister may seek advice from the NSW Coastal Council on whether the draft CMP has been prepared appropriately.

The Minister may decide to certify or refuse to certify the CMP. The Minister may request that the council amend the CMP to address matters identified in the reasons for refusal.

A council may seek advice from OEH about the preparation of new material to address any reason for the refusal of a certification.

4.7. Gazettal and availability of the CMP

After the coastal management program has been certified by the Minister, a local council must publish it in the Gazette.

A coastal management program takes effect on the date on which it is published in the Gazette or, if a later date is specified in the program for its commencement, on the later date so specified.

Councils may wish to notify specific stakeholders that the CMP is adopted, certified and gazetted. This may be achieved through electronic media, notices in local newspapers, and/or through direct correspondence to the most affected landholders.

Relevant public authorities should also be notified of certification to enable implementation of any coastal management actions for which it is intended they are to be responsible for.

Implementation of a CMP, through planning and development control measures, on-ground works, community involvement, monitoring or other processes, is discussed in **Stage 5**.

4.7.1. Good faith and liability

Section 733 (2) of the *Local Government Act 1993* provides that a local council does not incur any liability in respect of:

- any advice furnished in good faith by the council relating to the likelihood of any land in the coastal zone being affected by a coastline hazard (as described in the coastal management manual) or the nature or extent of any such hazard, or
- anything done or omitted to be done in good faith by the council in so far as it relates to the likelihood of land being so affected.

Also, section 733 (4) (b) relevantly provides that a council is, unless the contrary is proved, taken to have acted in good faith for the purposes of section 733 if the advice was furnished, or the thing was done or omitted to be done substantially in accordance with the principles and mandatory requirements set out in the coastal management manual.

Our future on the coast

NSW Coastal Management Manual Part B: Stage 5 – Implement, monitor, evaluate and report

NSW GOVERNMENT

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Stage 5 provides guidance for a council on:

- implementing actions in the published coastal management program (CMP) through the Integrated Planning and Reporting (IP&R) framework and land use planning system
- implementing actions in partnership with adjoining councils and public authorities where relevant
- implementing an effective monitoring, evaluation and reporting (MER) program
- monitoring indicators, trigger points and thresholds
- amending, reviewing and updating the CMP
- reporting to stakeholders and the community on progress and outcomes through the IP&R framework.

5.1 Overview of Stage 5

The following sections of the *Coastal Management Act 2016* and associated mandatory requirements in Part A are most relevant to this stage.

Section 18 Review, amendment and replacement of CMPs.

Section 19 Inspection of a CMP.

Section 22 Implementation of a CMP by local councils.

Section 23 Other public authorities to have regard to a CMP and the manual.

Stage 5 of Part B of this manual provides councils with guidance on how to implement and give effect to their coastal management program (CMP) in three main ways:

- by integrating coastal management actions into their Integrated Planning and Reporting (IP&R) framework (refer to **Figure B5.1**)
- through the land use planning system
- in partnership with, or by other councils and public authorities, where relevant.

Stage 5 includes guidance on ongoing monitoring and reporting of the implementation of a CMP to meet the requirements of the IP&R framework and the *Coastal Management Act 2016* (CM Act).

Monitoring and reporting provide information about the effectiveness of management actions and identifies approaching thresholds which may support a change in management response. The monitoring results will be used in the review and update of the CMP.

5.2 Implementing the CMP through the IP&R framework

Councils' IP&R framework comprises the following elements:

- Community Strategic Plan (reviewed on 10-year cycles).
- Resourcing Strategy, consisting of:
  - long-term financial plans
  - workforce management plans
  - asset management policy, strategy and plans.
- Delivery Program (reviewed in four-year cycles).
- Operational Plan (updated annually).

These elements are informed by community engagement, asset management processes, service delivery and the ongoing monitoring and reporting of progress.

To give effect to the CMP in the preparation of its plans, strategies programs and reports under Part 2 of Chapter 13 of the *Local Government Act 1993,* councils can consider making the relevant objectives, themes and priorities of the Community Strategic Plan consistent with the vision, strategic direction and priorities in the CMP or recognising actions from the CMP in the relevant four-year Delivery Program and Annual Operational Plans.

Resourcing implications of the CMP should be reflected in the Resourcing Strategy and CMP actions relating to council assets should be considered in the Asset Management Plan.

Figure B5.1 shows how the CMP process informs, and is informed by, the elements of the IP&R framework. More detail about what is involved in integrating coastal management in the ongoing planning and delivery process for council's broader responsibilities is set out in the following sections.

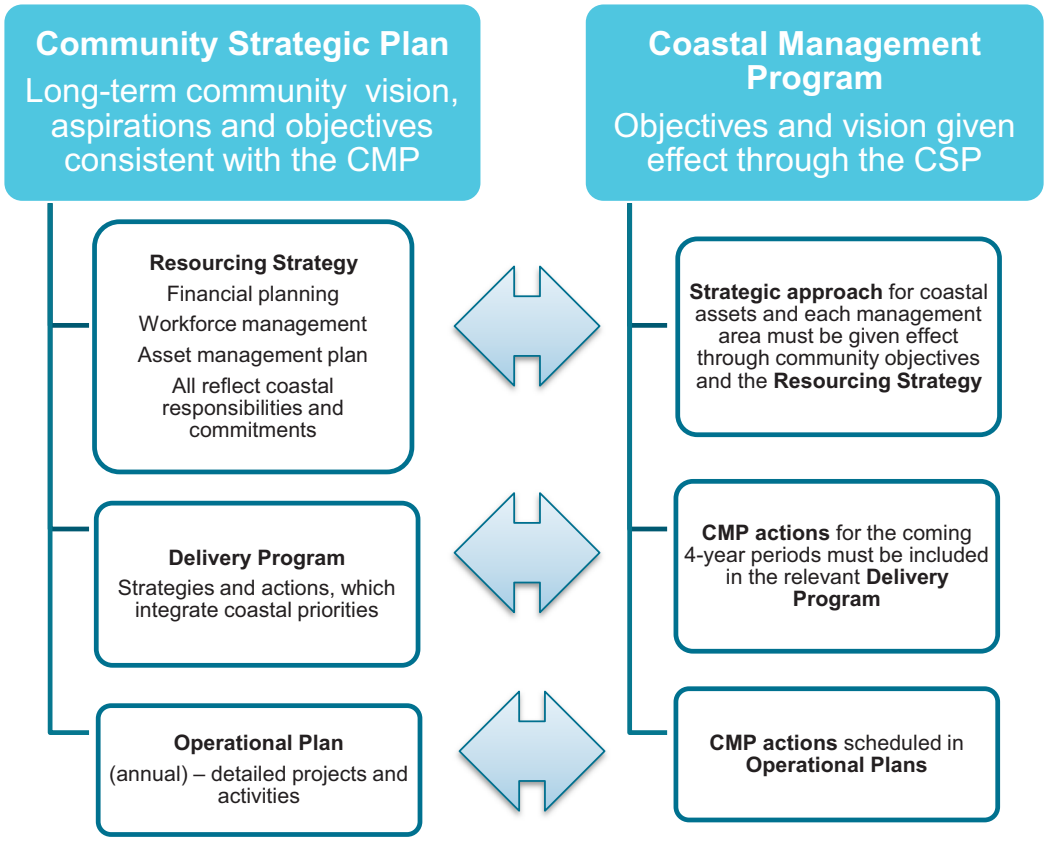

Figure B5.1 Relationship between elements of the IP&R framework and the CMP

5.2.1 Integrating coastal management with the Resourcing Strategy

The Resourcing Strategy, amongst other things, quantifies a council's financial commitment to implement the strategies established in the Community Strategic Plan and is critical to the planned and costed implementation of coastal management actions.

Under the IP&R framework, councils undertake their strategic financial planning for a 10-year timeframe, to accommodate longer-term infrastructure and planning commitments. Councils should be aware that the actions required to effectively implement a CMP may extend well past the 10-year timeframe.

Potential long-term contingent liabilities such as asset management commitments (including project management, planning, design, impact assessment, construction, maintenance or upgrading of coastal protection works or actions) arising from actions in the CMP should be considered in the preparation of the Resourcing Strategy.

The economic evaluation of coastal management options, prepared in Stage 3, will provide useful information about resourcing requirements for coastal management and implementing the CMP.

Councils will refine their financial planning in the delivery stages (Delivery Program and annual Operational Plan), so giving effect to the CMP through council's financial planning is an iterative and multi-timeframe process.

Table B5.1 shows how the CMP should be linked into council's financial planning processes for short, medium and long timeframes.

Table B5.1 Linking CMP processes with council's financial planning in the Resourcing Strategy

Sustainable financial planning for council's coastal responsibilities		
Timeframe – one year	**Timeframe – four years**	**Timeframe – 10 years and longer-term**
Very detailed, project-based financial planning: What coastal actions will be delivered (or continue to be delivered) in this year? Are any changes to specific funding models required (e.g. changes to grant programs and priorities)? Link Stage 5 of the CMP with the Delivery Program and Operational Plan.	**Detailed, program-based financial planning for the Delivery Program:** CMP Stages 4 and 5 – consistent with Delivery Program. Incorporate detailed costs and benefits of coastal management actions. Confirm any necessary alignment of agency and council programs. Confirm that cost-sharing for capital works and maintenance for coastal protection works is functioning as intended. Specify funding through agreed and certain mechanisms for each coastal management action, for example: • short-term levies or changes in rates • grant programs • internal workforce • borrowings.	**Financial projections and assumptions for a financially viable council:** Have long-term coastal opportunities and commitments, including contingent liabilities, been included? CMP to inform the 10-year and longer-term financial plan. What are the future coastal opportunities for growth and income? What impact could coastal risks and coastal management actions have on council's revenue and expenses (such as insurance premiums for assets and public liability)? Are formal arrangements in place for long-term cost-sharing such as required for coastal protection works? What financial mechanisms can be used to deliver the coastal objectives? What approvals are required for options such as rate changes or levies?

5.2.2 Incorporating CMP actions in the Delivery Program and Operational Plan

The Delivery Program is where the community's strategic goals are translated into actions. In the IP&R framework, the Delivery Program is a fixed four-year plan, which is a statement

of commitment from each newly elected council. Each new Delivery Program is intended to be the central reference point within council for decision-making and tracking performance over the four-year election period.

A wide range of coastal management actions from the CMP will be implemented through schedules and detailed project and budget planning established in the four-year Delivery Program and Annual Operational Plans.

Examples of coastal management actions that may be specified in a CMP include actions relating to:

- coastal protection works, including dune reshaping, beach nourishment and protection structures
- beach, foreshore and waterway access ways and facilities
- foreshore park design, accessibility and facilities and actions to improve the safety, amenity and enjoyment of people using the coast for recreation
- restoration or enhancement of ecological communities
- management of environmental issues such as soil/sediment contamination, water pollution or unauthorised development
- research, monitoring, data collation and reporting
- the relationship and partnership between council and other public authorities or landowners (including Aboriginal landowners and claimants and registered Native Title applicants) on the coast
- community awareness, engagement and participation in coastal management.

Further information about when these actions may be appropriate and how to apply them is in Stage 3.

5.2.3 Linking with the Asset Management Plan

Built assets and infrastructure are the focus of the Asset Management Plan. To facilitate integrated delivery of CMP actions that relate to council assets, the CMP will need to identify and map where relevant:

- council assets (natural and built) in the relevant coastal management areas, including essential community infrastructure (such as roads and utilities) and access and amenity assets
- infrastructure assets that may be affected by coastal hazards over time
- management actions for these assets to mitigate risks and maintain service delivery (including access and amenity) where those assets may be affected by coastal hazards
- any projected asset management (including insurance) and asset maintenance, rehabilitation and replacement costs, particularly in coastal vulnerability areas
- a service standard for coastal assets, related to safety, structural integrity and amenity.

It is recommended that councils report on the condition of coastal assets and the extent to which coastal management actions have achieved objectives and service standards for those assets.

Regular review of the CMP as it relates to council assets would facilitate achievement of the IP&R Guideline requirements for continuous improvement of asset management capability, effectiveness and community satisfaction.

5.3 Implementing the CMP through the land use planning system

A council's Community Strategic Plan sets out high-level strategic objectives and is relevant to the preparation of the local strategic planning statements prepared by councils under Part 3, Division 3.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Well informed coastal planning is an essential tool in ensuring orderly development of our coastline into the future. The information collated through the CMP process, including coastal risk assessment, community acceptance and the identification of appropriate management response, is critical in driving sound strategic land use decisions.

5.3.1 Strategic land use planning

It is good practice for councils to consider coastal management issues, threats, risks and opportunities when they prepare local land use strategies such as local strategic planning statements, settlement strategies, growth plans, tourism strategies and conservation strategies.

The CM Act requires that public authorities (other than local councils) are to have regard to CMPs to the extent that those programs are relevant to the exercise of their functions. In particular, those public authorities are to have regard to relevant CMPs and the coastal management manual in the preparation, development and review of, and the contents of, any plans of management they are required to produce (**See Section 5.4)**.

In considering coastal management issues and implementing the CMP in preparing strategies councils and public authorities will identify land suitable for future environmental conservation, coastal development and related economic activity, consistent with:

- objects of the CM Act
- management objectives for the four coastal management areas defined in the CM Act and the *State Environmental Planning Policy (Coastal Management) 2018* (CM SEPP)
- a CMP
- objects and requirements of the EP&A Act (including local planning directions under s.9.1 of the EP&A Act).

To be effective in achieving the state's objectives for the coast, the strategic plans for coastal areas in adjoining local councils should adopt a consistent approach to the values, vulnerabilities and opportunities of the coastal management areas.

5.3.2 Land use and development controls in the LEP and DCP

Land use controls in council areas are generally given legal effect by Local Environmental Plans (LEP) under the EP&A Act. These are initiated by councils by preparing a planning proposal. Councils also make development controls plans which provide guidance as to certain matters to people carrying out development. The objects of the CM Act, the strategic direction identified in the CMP and coastal vulnerabilities associated with coastal hazards and environmental sensitivity can be considered by councils in preparing these proposals and plans to give effect to the CMP.

The management objectives of relevant coastal management areas in sections 6, 7, 8 and 9 of the CM Act and mapped in the CM SEPP are relevant considerations for council in these

land use planning processes. For instance, council can consider the following information in a CMP when preparing a planning proposal to amend a LEP or development control plan (DCP) for coastal vulnerability areas:

- the results of coastal hazard studies
- the resilience of infrastructure such as road access, stormwater drainage and sewerage systems
- opportunities to reduce the impacts of coastal development and land use on the health of the coastal environment area and coastal wetlands and littoral rainforests areas (these impacts may relate to drainage, stormwater, effluent management, clearing or filling)
- the influence of coastal protection measures on land capability (e.g. land protected by a seawall) and over what timeframe
- measures to address residual risks from coastal hazards
- opportunities to accommodate future growth in coastal communities
- opportunities to reduce the risk by redevelopment of existing developed areas
- maintenance of foreshore access, amenity, open space and protecting the coastal environment.

A Local Planning Direction – Coastal Management has been made in accordance with s.9.1 of the EP&A Act and aims to protect and manage coastal areas of NSW.

The Local Planning Direction – Coastal Management directs that councils in their role as a planning authority when developing a planning proposal must not rezone land which would enable increased development or more intense land use on land:

- within a coastal vulnerability area identified by the CM SEPP
- that has been identified as land affected by a current or future coastal hazard in a LEP or DCP, or a study or assessment undertaken:
    - by or on behalf of the relevant planning authority and the planning proposal authority
    - by or on behalf of a public authority and provided to the relevant planning authority and the planning proposal authority
- within coastal wetlands and littoral rainforest areas identified by the CM SEPP.

A council's DCP must be consistent with the LEP. Section 22(2)(b) of the CM Act requires councils to give effect to its CMP through the preparation of planning proposals and DCPs. A DCP may contain more detailed guidance on development for coastal management areas.

Implementation of the CMP will include consideration of the CMP in undertaking land use planning functions under the EP&A Act, including preparing planning proposals and DCPs. Land use zoning and controls in the DCP should encourage development that aims to manage impacts on existing and future development and to improve community resilience consistent with the CMP.

Where the CMP suggests this approach, councils can consider using a broad risk management hierarchy of avoidance, minimisation and mitigation, and reduce the overall risk by:

- ensuring that there is no increase in the level of risk for existing and future development
- reducing the exposure and vulnerability of development and assets
- steering new development towards areas of lower risk and promoting development that is compatible with the level of risk
- avoiding intensification and expansion of development in coastal vulnerability areas and in or around coastal wetland and littoral rainforest areas

- considering the vulnerability of differing land uses and development to varying levels of risk from coastal hazards
- designing development and infrastructure to be more resilient to coastal risks
- identifying triggers and thresholds for changes in land use or types of development
- protecting important environmental assets and values, including beaches, foreshores, environmental features and healthy coastal waterways
- enhancing opportunities for appropriate coast-dependent businesses, that support economic growth and resilient coastal communities.

Figure B5.2 shows the various influences on the LEP and DCP.

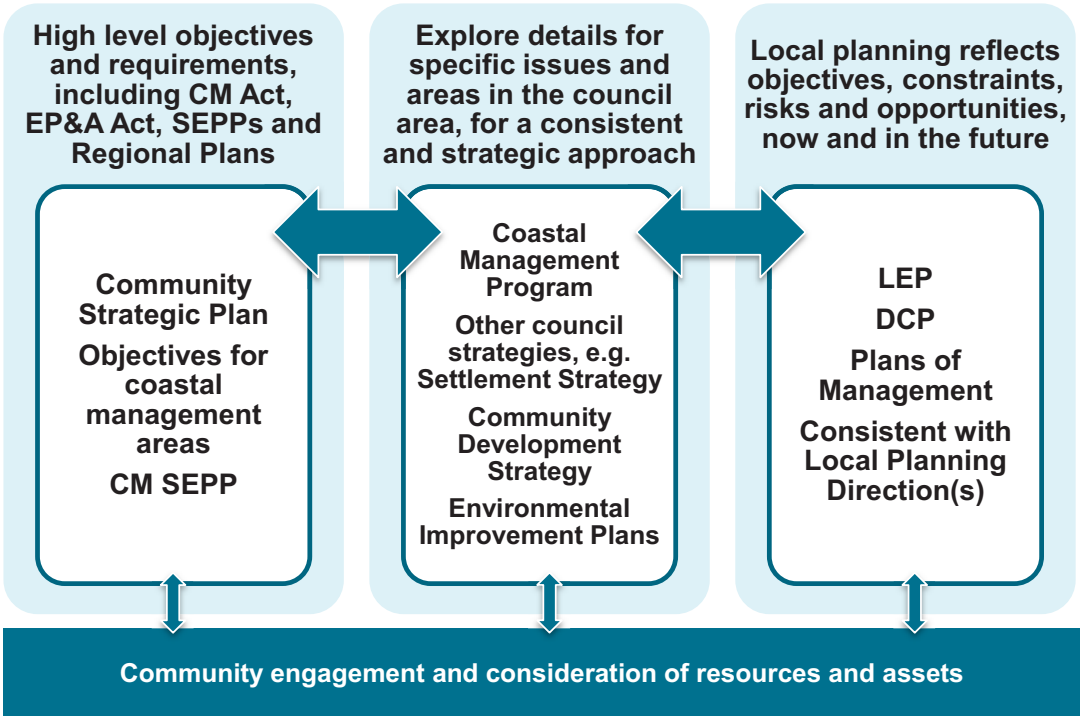

Figure B5.2 The LEP and DCP control land use and development consistent with strategic objectives and plans

5.3.3 Land use planning in coastal wetlands and littoral rainforests areas

The focus of development controls applying to this coastal management area is to protect the natural state of sensitive ecological communities, including their biodiversity and ecosystem integrity, improve their resilience to climate change and promote their restoration if degraded (Clause 10 of CM SEPP).

Clause 5 of the Local Planning Direction – Coastal Management made under section 9.1 requires that a planning proposal must not rezone land which would enable increased development or more intensive land use on land within coastal wetlands and littoral rainforests areas.

If consistent with the CMP, the LEP and DCP should identify appropriate development in coastal wetlands and littoral rainforests areas. They may also identify standards, measures

or conditions to be met to facilitate development that maintains or improves the functioning of these natural assets. For instance, the DCP may specify requirements for development within the perimeter area of a coastal wetland or littoral rainforest, to protect surface or groundwater quality, habitat quality and conservation values.

5.3.4 Land use planning in coastal vulnerability areas

If the CMP provides a coastal management action in relation to providing appropriate planning controls for the coastal vulnerability areas this may be implemented with a focus on development controls. These controls would require consent authorities to be satisfied that appropriate measures and responses are in place to manage risk to life and public safety from current and future coastal hazards identified in the CMP. This can include siting of the development, design and construction elements, or consent conditions relating to time and trigger limits.

Clause 4 of the section 9.1 direction – Coastal Management, requires that a council must not rezone land that would enable increased development or more intensive land use in the coastal vulnerability area (see **Section 5.3.2**). It is important that land use zoning is compatible with current and future risks from coastal hazards and the effects of climate change identified in the CMP.

If necessary to implement the CMP, provisions in the LEP could be amended to encourage appropriate development and may also prohibit specific types of development in coastal vulnerability areas. Development permitted in a coastal vulnerability area must satisfy the requirements of Clause 12 and Clause 15 of the CM SEPP.

Councils should consider the vulnerability of different land uses and development to varying levels of risk from coastal hazards identified in the CMP, the types of development that may be appropriate and what level of risk assessment may be required as set out in the CMP. **Table B1.3** outlines the vulnerability of a variety of land uses.

Clause 15 of the CM SEPP requires that development consent must not be granted to development on land in the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land.

The vulnerability of different types of development is an important factor when considering development proposals in the coastal vulnerability area.

Table B5.2 provides an indication of the types of development that may be suitable in areas subject to different levels of risks from coastal hazards identified in the CMP. Refer to **Table B1.3** for information about vulnerability of different development types. **Figure B1.5** identifies levels of risk.

Mitigation structures and a range of recreational and public land management activities may be suitable in areas subject to extreme risk and will be identified in the CMP. Where the CMP identifies areas of extreme risk the CMP will be given effect by generally avoiding new development in those areas. If such a management action is identified in the CMP, public authorities should plan to relocate existing essential infrastructure from these areas, where the CMP identifies that new essential infrastructure, such as water and wastewater infrastructure, must be located in these areas, it should be designed appropriately.

Less vulnerable uses (such as commercial developments and agriculture) may be suitable in areas identified in the CMP as at high risk from coastal hazards, subject to rigorous assessment.

Highly vulnerable uses may not be suitable in areas identified in the CMP as having a risk greater than medium and most vulnerable uses may only be suitable in areas with low risks from coastal hazards.

Table B5.2 **Risk vulnerability and indicative development suitability** (Source: modified from Guidance - Flood risk and coastal change, UK Department for Communities and Local Government, 2014)

	Vulnerability category				
Risk classification	**Essential infrastructure**	**Compatible uses**	**Most vulnerable**	**Highly vulnerable**	**Less vulnerable**
Extreme	Further detailed assessment is required to determine suitability	Yes	No	No	No
High	Further detailed assessment is required to determine suitability	Yes	No	No	Further detailed assessment is required to determine suitability
Medium	Yes	Yes	Further detailed assessment is required to determine suitability	Further detailed assessment is required to determine suitability	Yes
Low	Yes	Yes	Further detailed assessment is required to determine suitability	Yes	Yes

5.3.5 Land use planning in coastal environment areas

LEP and DCP land use planning controls for the coastal environment area should give effect to management objectives identified in the CMP for this area and the requirements of the CM SEPP to minimise impacts on environmental systems and values.

Where the CMP identifies land as coastal environment area, to give effect to this development controls should generally aim to:

- avoid adverse impacts on the environment or coastal processes
- avoid adverse impacts on water quality in the marine estate, including the cumulative impact of development on sensitive coastal lakes and estuarine waters and incorporate water sensitive urban design principles
- maintain natural sections of the coast
- protect Aboriginal cultural heritage and places
- protect native vegetation including that on undeveloped headlands and dunes
- protect aquatic, intertidal and foreshore habitat
- protect the surf zone.

5.3.6 Land use planning in coastal use areas

Coastal use areas may be identified in the CMP and if so, land use planning considerations will be aimed at mitigating existing and future risks associated with coastal hazards,

development control in these areas should reflect relevant coastal values identified in the CMP such as water quality, coastal vegetation, accessibility, scenic amenity and protection of coastal open space and recreational areas from overshadowing by the height and bulk of urban development.

Where the CMP identifies proposed changes to the planning controls, if consistent with the CMP these changes should aim to:

- maintain or improve public access to beaches, foreshores, dunes and headlands
- minimise overshadowing, wind funnelling and loss of views from public spaces
- not detract from the scenic nature of the coast and maintain visual connections from public land to the coast
- maintain natural areas along the coast
- protect items and places of historic heritage
- protect Aboriginal cultural heritage and provide for Aboriginal community access to cultural heritage sites, resources and gazetted Aboriginal Places
- protect the surf zone
- accommodate both urbanised and natural stretches of the coastline.

Figure B5.3 illustrates the application of development controls in the design of a coastal urban area.

Figure B5.3 Example of the application of development controls in a coastal use area
(Source: North Coast Urban Design Guidelines NSW Department of Planning 2008)

5.3.7 Choosing an appropriate land use zone for coastal management areas

The CMP may identify proposed changes to land use zoning in coastal areas. Where changes are pursued, councils should consider the CMP as well as relevant matters under the EP&A Act including the:

- requirements of the Standard Instrument and other planning guidelines, practice notes and circulars issued by the Minister responsible for planning
- extent of overlap between the four coastal management areas. This determines the hierarchy of coastal management objectives that will apply to the locality
- existing primary use and value of the land, such as residential, tourism, conservation or environmental management
- proposed long-term use and value of the land, considering coastal processes and hazards for planning horizons such as immediate, 20 years, 50 years, 100 years and beyond, where appropriate
- capacity of the council and community to manage coastal vulnerability by maintaining measures such as coastal protection works and works to improve drainage in low-lying areas over the long-term planning horizon
- council's flexibility and capacity to accommodate and limit the risks associated with uncertainty by incorporating adaptive strategies
- the public interest.

The current primary use of a coastal management area may include residential development, commercial activity, recreation or agriculture, as well as conservation or environmental management. Where necessary to give effect to the CMP, councils should consider rezoning land that is within a coastal vulnerability area to best align future land use (e.g. through redevelopment) with the anticipated coastal risk.

Similarly, a change to zoning may be necessary to give effect to the CMP to allow a coastal environment area such as a beach or coastal dunes or coastal wetland (such as saltmarshes) to respond to climate change.

5.4 Implementing the CMP in partnership with other councils and public authorities

There are mutual benefits to local councils and public authorities in working together to implement the actions in a CMP. Consultation with public authorities and neighbouring councils is recommended when preparing and implementing a CMP. When preparing policies, programs or plans of management relating to their coastal responsibilities, public authorities are required to recognise the:

- objects of the CM Act in terms of their objectives and contents
- strategic direction and priorities of a CMP
- the public interest as it applies to the coastal zone.

These policies, programs and plans of management may include:

- settlement and infrastructure strategies for coastal regions
- regional economic development or tourism strategies
- regional environmental or biodiversity strategies
- waterway dredging programs

- plans of management prepared for lands managed by public authorities (such as those prepared under the *Local Government Act 1993*, *Crown Lands Act 1989* (or *Crown Land Management Act 2016*, when commenced), or the *National Parks and Wildlife Act 1974)*
- management plans prepared for recreational boating or other uses of coastal waterways.

It is best practice for councils to develop and maintain clear communication and a collaborative approach with adjoining councils and with public authorities. This will facilitate integrated delivery of projects and programs. It will also facilitate efficient use of resources and reduce duplication where roles and responsibilities are shared or adjoin.

Councils are encouraged to work closely with public authorities who own or manage coastal land, particularly where landholders consent may be required for proposed works. Actions should also be consistent with the purpose of Crown or other public reserve land.

Councils are advised to maintain records of consultation with public authorities and adjoining councils, as part of the evidence which may be requested by the NSW Coastal Council in the conduct of a performance audit of implementation of the CMP. **Section 5.7.1** provides details.

5.5 Compliance and enforcement

Compliance and enforcement arrangements are a necessary part of the orderly management of the coastal zone. The compliance and enforcement powers under the EP&A Act have been broadened in relation to unauthorised works and development in the coastal zone.

Action can be taken by land managers to prevent and remedy damage caused by:

- illegal or unauthorised works (resulting in increased erosion or other impacts such as rock debris on beaches)
- other inappropriate development undertaken along the coast.

Compliance activities can also be used to:

- minimise the likelihood of public safety issues arising from poorly designed, placed and maintained works, including coastal protection works, access structures (such as cliff top and dune crest lookouts and pathways) and drainage
- prevent or mitigate legacy issues for coastal communities
- demonstrate council's strategic direction and send a clear message about acceptable and unacceptable approaches to managing coastal areas
- demonstrate that a council is managing the coast in accordance with its CMP.

The main tools used by councils under the EP&A Act for investigating and dealing with unauthorised works and development are:

- investigation powers
- orders under section 121B9.34
- penalty notices or fines.

Other relevant enforcement provisions include penalties under the *Protection of the Environment Operations Act 1997* (PoEO Act) for illegal dumping of materials and the *Local Government Act 1993* (LG Act).

At any time during the preparation of, or after the gazettal of, a CMP it is important that councils and public authorities work together to undertake relevant compliance and enforcement actions when illegal or unauthorised activities take place. This will reinforce consistent messages about inappropriate responses to coastal issues.

5.6 CMP monitoring, evaluation and reporting

An important purpose of preparing and implementing a CMP is to strengthen the resilience of natural coastal systems and create sustainable opportunities for coastal communities. To maintain focus, highlight successes and provide early warning of problems, it is important to monitor and review progress towards these outcomes at regular intervals. This approach will also assist in developing and applying an approach of continuous improvement in coastal management across New South Wales.

The IP&R reporting system (including annual operational reporting and longer interval strategic reporting) provides the opportunity to formally report on monitoring of coastal management and its outcomes.

The NSW Coastal Council can conduct performance audits and provide advice to the Minister on the status of CMP implementation by local councils (see **Section 5.7.1**).

5.6.1 CMP monitoring requirements

Councils and public authorities (where relevant) should develop and implement a monitoring program for the delivery of the CMP. An overview of this monitoring program should be included in the CMP, with details in the supporting documents.

A council's coastal monitoring program should be fit-for-purpose and focus on information needed to evaluate the outcomes of coastal management actions. This will contribute to the long-term adaptive management of the coast.

Key elements of a monitoring program should consider:

- the implementation status of the CMP
- socioeconomic and environmental parameters
- triggers and thresholds
- the outcomes of the CMP in meeting the objects of the CM Act.

This program should not duplicate existing monitoring programs (but may make use of data from existing monitoring programs when the objectives and methods are relevant). Responsibilities for monitoring should be clearly stated.

Councils may access a range of coastal monitoring data that is collected by the NSW Government, such as:

- tides and water levels
- water quality for primary contact recreation at beaches
- LiDAR, aerial photography and other spatial data.

Multiple publications from the NSW Government, non-government organisations and universities provide guidance on the design of monitoring programs with the relevant indicators, scale, complexity and timing to track changes in the condition of coastal landforms and ecosystems and the social and economic wellbeing of coastal communities.

Effective long-term environmental monitoring can be challenging as it requires clear objectives, good design (reflecting the dynamic nature of the coast), careful review and long-term commitment. Well-designed long-term monitoring provides the evidence on which to base effective coastal management decisions including adaptive changes.

Complex monitoring programs for water quality or ecological indicators can be expensive and labour intensive and may not be practical or necessary for all coastal councils. They can also create large amounts of complex data that is hard to interpret. Monitoring should be

reported at meaningful timeframes for the performance issues being tracked (see **Table B5.3** for some examples).

Table B5.3 Types and timeframes of monitoring and reporting

Key monitoring and reporting issues to be identified in the CMP	Annual	4 years (IP&R)	10 years (review CMP)
Whether the priority coastal management actions for the planning period have been delivered as intended	Yes	Yes	Yes
Whether the implemented actions achieved the intended outputs and outcomes. This is generally site-specific. It should include short-term outcomes and monitoring that tracks the long-term resilience of the outcomes of management actions	Program specific	Yes	Yes
The overall condition of coastal wetland and littoral rainforest and coastal environment areas, based on an array of monitoring points that provides information about diverse aspects of the coastal environment, relevant to council and/or public authority responsibilities	No	If needed for council's SOE Report	Yes
Whether any critical thresholds or trigger points have been passed	Only when a trigger has been reached	Yes	Yes
Community use of the coast and satisfaction with the management of the coast	Possibly	Yes	Yes

5.6.2 Involving the community and stakeholders in the monitoring program

To help raise awareness of coastal issues, and to facilitate landscape-wide sampling, councils are encouraged to involve community organisations and individuals in coastal monitoring and reporting. This could include:

- Partnerships with universities and local community groups that conduct their own monitoring programs relevant to their specific interests, e.g. migratory shorebird observations by bird groups, photos of sites sensitive to biophysical change (king tides).
- A broader community workshop process to discuss environmental and development pressures, management responses and environmental condition.
- Community participation in implementing council's monitoring program in the coastal environmental areas, or participation in special monitoring events. Community monitoring programs are part of citizen science.

- Awareness raising activities for the broader community on what the monitoring means and implications for future actions and priorities.

5.6.3 Reporting

Councils should report progress in implementing the CMP as part of their IP&R framework and consistent with the CM Act and in doing so, will cumulatively provide valuable information for the strategic review of the CMP. Councils are encouraged to promote the successes in developing and implementing CMPs.

Public authorities should report on the implementation of coastal management actions in their routine program-based reporting or in reporting linked to relevant plans of management.

5.7 Review of the CMP

The CM Act (section 18(1)) requires a council to ensure that its coastal management program is reviewed at least once every 10 years. A council may review or update the CMP sooner, for any reason, including if there are significant new circumstances which need to be considered. **Part B Stage 1** provides information about the requirements and matters to consider for a review of the CMP to assess its overall performance and determine any important changes that need to be made.

The review of the CMP may consider:

- the extent to which actions proposed to be wholly implemented within that 10-year period have been implemented and the outcomes achieved
- progress in the implementation of responses, actions and commitments which continue beyond the 10-year timeframe
- whether coastal change (either related to the implementation of the CMP, or for reasons outside of the CMP) has reached a threshold where the strategic management approach needs to be reviewed.

It is advisable for councils to consider the implications of the longer-term commitments that may be inherent in the CMP. These include actions that will need to be continued in order to support development consents that have been issued on the assumption that the management regime certified and adopted in the CMP will be ongoing.

5.7.1 Role of the NSW Coastal Council in Stage 5

The Minister may request the NSW Coastal Council to undertake a performance audit of the implementation of CMP of a local council. The purpose of the performance audit is to determine whether a local council is effectively implementing its CMP and to identify opportunities for local council capacity building.

A council will be required to provide information and records in connection with the performance audit to the NSW Coastal Council when directed to do so by a notice in writing.

The Coastal Council is to provide a report to the Minister. The Minister is required to table the reports in each House of Parliament within 3 months of the end of each year.

Where there is a significant lack of implementation of a council's CMP, the NSW Coastal Council may make recommendations to the Minister on appropriate remedial actions to be taken, including referral to the Minister administering the *Local Government Act 1993* for further consideration.

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