Towards a National Collaborative Approach to Managing Coastal Hazards in Australia

Report of the
Intergovernmental Coastal Hazards Working Group
to the Energy and Climate Change Ministerial Council

November 2023

Dune protection fencing, Koonya Back Beach, VIC.
Photo: Parks Victoria

Colloroy Beach, June 2016.
Photo: NSW Department of Planning, Industry and Environment

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The Intergovernmental Coastal Hazards Working Group met between February 2020 – August 2021 to complete this report. The Group made minor changes in February and November 2022 and re-endorsed the report.

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Towards a National Collaborative Approach to Managing Coastal Hazards in Australia

On behalf of the Coastal Hazards Working Group, I am pleased to present its findings and recommendations for strengthening and developing a national collaborative approach and framework for coastal hazards.

The report was developed between February 2020 and August 2022, and was considered and noted by the Energy and Climate Change Ministerial Council in July 2023. The report provides a valuable snapshot in time of a national issue that requires a coordinated response across local, State and Federal Governments. Costs and figures while no longer current, provide an indication of the scale of the issues to be addressed.

It is pleasing that before the report was finally considered, the Australian Government announced funding to address planning and management of natural hazards including those on the coast. In 2022 the $50 million Coastal and Estuarine Risk Mitigation Program opened to support projects that reduce the impact of natural disasters on coastal communities. This has been succeeded by the Disaster Ready Fund which will provide up to $200 million per year, over five years from July 2023 in Commonwealth funding, seeking matching funding from states and territories to fund projects that build resilience to prepare for, or reduce the risk of, future natural hazard impacts. In June 2023, the National Emergency Management Agency announced 187 projects, with a total value of just under $400 million.

The Coastal Hazards Working Group looks forward to having an ongoing advisory role, at the national level including on projects such as the National Climate Risk Assessment, the development of a National Adaptation Plan and other national level responses to coastal hazards.

Jacquie Stone

Chair

Coastal Hazards Working Group

November 2023

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Cottesloe Beach WA, June 2019.
Photo: Department of Planning, Lands and Heritage

Summary

The Australian coastline extends more than 35,000 kilometres, excluding estuaries and small offshore islands[1].

Most of Australia's population live in coastal areas. 50% of our community lives within 7 kilometres of the coast and ports while more than 80% live within 50 kilometres of the coastline. The land and sea are of spiritual, cultural and economic importance to Australia's first people and we acknowledge their contribution to the management of land, water, the natural landscape, and our built environments. As an island nation, our coastal destinations are where Australians live, work and play. They are a major drawcard for recreational and tourism sectors, and host critical infrastructure to service Australia's mining and export industries.

Within the next 80 years, more than $226 billion of public and private assets will be potentially exposed to coastal hazards. Based on the Intergovernmental Panel on Climate Change's latest projection of a likely sea level rise up to 1.1 metres by 2100, it is estimated that more than 200,000 commercial, light industrial and residential buildings, and 27,000 kilometres of road and rail assets will be impacted by coastal erosion or inundation across Australia[2]. These coastal hazards will also increasingly impact on natural systems and the ecosystem services they provide. In addition, a diversity of social and cultural values will be affected with flow-on social and economic impacts.

Managing coastal hazard impacts involves complex strategic planning and is a national issue that requires a coordinated response across local, State and Federal Government. Each year, State Government spending on coastal management and planning totals $48 million★. For local government, this is estimated to be significantly higher with between $90 million and $227 million spent each year✪. Nationally, costs to adequately manage coastal hazards are estimated to be up to $350 million per year, for the next 5 years✪. A National funding program to support coastal hazard risk management is required to address the gap between the growing cost of coastal management and adaptation, and the funds available through State and local government budgets.

Without a coordinated response and National leadership on coastal management, supported by funding from all levels of Government, the threat of coastal hazards on many of Australian beaches and adjacent properties within the next 80 years will accelerate, delivering significant economic impacts through the loss of private and public assets. Since 2006, there have been nine separate – but successive – Commonwealth reports, initiatives or Parliamentary Inquiries all of which have concluded the need for a national approach to coastal management.

The Coastal Hazard Working Group's research and deliberations have led to six linked recommendations, which are set out in full in Section 5 of this report.

The two key recommendations are the:

- Establishment of a National funding program; and
- Preparation of a National Coastal Hazards Adaptation Strategy, as is proposed by Infrastructure Australia.

For these to be achieved, it is necessary for a lead agency to be identified within the Australian Government, and for each of the State and Territory jurisdictions to determine a lead partner agency. This group would collaborate in achieving a workable strategy that delivers on the ground planning and management pathways to a sustainable coast.

The other four recommendations that support the two key recommendations are:

- A nationally-agreed Coastal Management Framework and Principles
- Improved community and stakeholder engagement and education
- Capacity-building of coastal decision-makers
- Update of the Climate Change Risks to Australia's Coast: A first Pass National Assessment.

★ Figure determined from 2020/21 grant funding estimates provided by each State and Territory

✪ Figure estimated by extrapolating results from a local government coastal hazards survey, conducted by the Australian Coastal Councils Association in July 2020.

Scale and impact of coastal hazard risk in Australia

New South Wales

Erosion impacts:

First pass: **54km of sandy coastline** within 55m of existing properties
93km of sandy coastline within 110m of existing properties
158km of sandy coastline within 220m of existing properties
Second pass: **1,200 lots** (2,300 total addresses) vulnerable at present day
3,100 lots (5,200 total addresses) vulnerable at 2050
4,800 lots (8,200 total addresses) vulnerable by 2100.
Third pass: **>1,000 lots** (2,000 total addresses) vulnerable at present day
2000 lots (3,700 total addresses) vulnerable by 2050
3,500 lots (6,800 total addresses) vulnerable by 2100.

Inundation impacts:

23,653 properties vulnerable (0.5m SLR)
50,744 properties vulnerable (1m SLR)
74,379 properties vulnerable (1.5m SLR).

Victoria

2017 state-wide investigation identified the extent of high value coastal assets that may be impacted by erosion or inundation. For residential coastal property:

6,118 ha (8.7%)* with high and very high coastal erosion vulnerability ratings
2,461 ha (3.5%)* impacted by 0.2m sea level rise at 2040
5,440 ha (7.7%)* impacted by 0.82m sea level rise at 2100
8,068 ha (11.5%)* impacted by storm surge at 2040
13,410 ha (19.0%)* impacted by storm surge at 2100

* Indicates the total of residential coastal land impacted.

Queensland

Erosion impacts:

Approx. 15,200 residential buildings located within 110m of 'soft' erodible shorelines of which approx. 5,400 are within 55m of 'soft' coast.

Inundation impacts:

Between **35,900 and 56,900 residential buildings** may be at risk from 1.1 metres of sea level rise.

Western Australia

Erosion impacts:

Erosion assessment identified **55 hotspot sites** in WA (approx. 51km of coastline).

136 assets (0-5 years)
201 assets (5-25 years)
252 assets (25 year+)

In addition, **31 watchlist sites** were identified for future investigation.

Inundation impacts:

Between 18,700 and 28,900 residential buildings may be at risk from 1.1 metres of sea level rise

South Australia

Erosion impacts:

Approx. **7,000 residential buildings** located within 110m of 'soft' erodible shorelines of which approx. 1,600 are within 55m of 'soft' coast.

Inundation impacts:

25,200 - 43,000 residential buildings may be at risk from 1.1 metres of sea level rise.

Tasmania

Erosion impacts:

734 houses potentially vulnerable (2010)
2,068 houses potentially vulnerable by 2050
3,788 houses potentially vulnerable by 2100 (5.7%)*.

Inundation impacts:

85 houses potentially vulnerable in 2010 from the 2010 mean high tide
1,373 houses potentially vulnerable by 2050 from a 1% AEP storm surge event or a 0.8m sea level rise from the 2010 mean high tide.
3,152 houses potentially vulnerable by 2100 (1.2%)*.

* Percent of existing residential

Northern Territory

Erosion impacts:

Up to **190 residential buildings** located within 110m of 'soft' erodible shoreline.

Inundation impacts:

Up to **180 residential buildings** may be at risk from 1.1 metres of sea level rise.

1 Background

Sea wall, Broome Town Beach, WA.
Photo: Shire of Broome

On 9 August 2019, the Council of Australian Governments (COAG) referred the issue of coastal erosion to the Meeting of Environment Ministers (MEM). Subsequently, on 8 November 2019, the Ministers acknowledged coastal erosion and inundation as a risk that requires a collaborative approach from all levels of government and agreed to establish an intergovernmental working group. On 4 December 2019, the MEM Adaptation Working Group agreed that a separate coastal hazards working group should be established.

The Coastal Hazards Working Group comprises representatives from each Australian State or Territory (with coastline), the Commonwealth and Australian Local Government Association. The Terms of Reference of the working group (Attachment 1) sets out the objectives to:

1. Collate existing information on the national scale and extent of coastal erosion and inundation hazard risks, their impacts, current management effort and estimates of future management needs.
2. Explore opportunities for a collaborative approach across jurisdictions to manage coastal erosion and inundation.
3. Recommend actions that will benefit from a national collaborative approach to manage coastal hazards for consideration at a future Meeting of Environment Ministers.

This report provides findings against these three objectives. In addition, the working group has considered and incorporated results from a national coastal hazards survey conducted by the Australian Coastal Councils Association (ACCA) in July 2020. Australia has a total of 238 coastal local governments; the survey was sent to 189 coastal local governments with 94 responses received.

2 Current Context

Coastal inundation, Saibai Island, Torres Strait.
Photo: David Hanslow

Coastal land is typically vested with, and managed by, local government. In some instances, this responsibility rests with the State Government, such as management of conservation reserves and waters within marine reserves. These two levels of government are primarily responsible for coastal planning and management who work cooperatively to deliver good outcomes along the coast from the limited funds available. Traditional Owners and Aboriginal communities also play a key role in leading, managing and co-managing coastal lands and sea country across Australia.

Coastal hazards threaten some of Australia's most valued natural assets, and a significant number of adjacent properties, public and private assets. Potential coastal hazards – the consequence of natural coastal processes that affect the environment, assets and the safety of people – include erosion and inundation (flooding).

The extent and severity of coastal hazards is being exacerbated by climate change, particularly sea level rise, but also changes to wave climate and increased storm intensity and frequency. By 2100, global mean sea level is projected to likely rise between 0.28 and 1.01m depending on the level of emissions[3]. A global sea level rise of up to 2m is possible if ice sheets melt faster than projected. Ongoing rise beyond 2100 is virtually certain due to continuing deep ocean warming and ice sheet melt.

The consequences of sea level rise include:

- flooding of low lying coastal and tidal areas with increased regularity;
- increased coastal erosion;
- loss of beaches; and
- higher storm surges that will affect coastal communities, infrastructure, industries and the environment.

Most State and Territory governments use sea level rise benchmarks for coastal planning, with values ranging from 0.8 and 1m sea level rise by 2100 (see table below).

Additional factors influencing the potential extent of coastal hazards include the type of coast, or coastal classification. For example, approximately 63% of the Australian coast is classed as either sandy or muddy, which are both mobile, and therefore more susceptible to erosion[4].

The tangible and intangible value of coastal assets at risk from coastal hazards, as well as the cost of adaptation measures to manage those assets is significant and likely to grow. Coastal hazards result in business interruption, emergency services response, post-incident and recovery effort, significant economic impacts and ongoing costs to the local community – all of which result in additional costs to Government.

Australian sea level rise benchmarks

	SNAPSHOT	CURRENT SEA LEVEL RISE PLANNING BENCHMARK
QLD	0.8m by 2100	Sea level rise factor of 0.8m by 2100.
NSW	No State sea level rise benchmark	Determined by individual Councils through a risk based approach using scientific advice and understanding of local processes and impacts.
VIC	0.8m by 2100	Plan for sea level rise of not less than 0.8m by 2100.
SA	1m by 2100	Requires development to be safe from the effects of a 0.3m sea level rise by 2050 and to be capable of being protected against additional recession due to a further 0.7m of rise by 2100 (total of 1m by 2100).
TAS	0.82 – 0.92m by 2100	North East Tasmania: 0.82m by 2100 Central North Coast Tasmania: 0.92m by 2100.
WA	0.9m by 2110	Sea level rise of 0.9m over a 100-year planning timeframe (2010 to 2110). Add 0.01m/year to 0.9m for every year beyond 2110.
NT	0.8m by 2100	Approximately 0.8m by 2100.

Increased focus on building skills and resilience in our communities to deal with the immediate and ongoing impacts of coastal hazards is needed to ensure that – with increases in population – future planning, development and activation along our coastline is considered in the context of exposure to coastal hazards, and all associated costs and risks.

2.1 State and Local Government

State and local governments are primarily responsible for the majority of expenditure required to directly manage our coasts. State Governments are currently spending more than $48 million each year on coastal planning and management activities. These funds are provided through programs detailed in Table 1 (pp. 30-36) and includes the following:

- Western Australia – Coastwest grants program; Coastal Management Plan Assistance Program; and Coastal Adaptation and Protection grants.
- South Australia – Coast Protection Fund; and regional grants.
- Tasmania – Tasmanian Coastal Adaptation Pathways Project.
- Victoria – Coastal protection grants, adaptation planning; Coastcare Victoria Community Grants program;
- New South Wales – Coastal and Estuary Grants Program; and Coastal Lands Protection Scheme.
- Queensland – Local Government Coastal Hazard Adaptation Program (QCoast2100); and Community Sustainability Action grants.

In addition, there is an estimated 108 full time public service employees directly engaged in coastal planning and management, valued conservatively at $10.8 million per year★.

★ Total FTEs have been calculated from Table 1 using the upper estimates for each State and Territory. Total FTE salary is based on an estimated individual annual salary of $100,000, which is considered conservative.

Local government expenditure on coastal planning and management activities is estimated to be significantly higher, ranging between $90 million and $227 million per year[5], covering both Council administered funds and any external funding such as State Government grants. This estimate does not include the number of employees working in this space across Australia's 238 coastal local governments.

Many of the State and local government led initiatives are recurrent and returning good results; but are limited in capacity. Further national collaboration and commitment, including with the Commonwealth, will strengthen the work being done at the State and local level, both accelerating remediation and slowing deterioration.

2.2 Commonwealth Government

The Commonwealth has made significant investments to ensure the Bureau of Meteorology continues to provide the Australian community with reliable, secure and ongoing access to weather, climate, water and oceans information. The Government is investing $149 million in the next phase of the National Environmental Science Program, and includes four new research hubs – Resilient Landscapes, Sustainable Communities and Waste, Marine and Coastal, and Climate Systems. The Climate Systems and the Marine and Coastal hubs will help inform climate adaptation solutions while also delivering research to underpin management of Australia's marine and coastal environments. The Government's investments in climate science include $25 million for a National Centre for Coasts, Environment and Climate to improve our understanding of climate change impacts on Australia's coastal environments.

In 2021, the Australian Government released the National Climate Resilience and Adaptation Strategy 2021-2025 (NCRAS)[6]. It includes three objectives to drive Australian Government action to fulfil its 2012 COAG roles and responsibilities[7].

The National Adaptation Policy Office (NAPO) has been established in the Department of Climate Change, Energy, the Environment and Water to coordinate work on climate adaptation across all governments and to provide a central point of contact and information for businesses and communities.

The Commonwealth Climate Risk and Opportunity Management Program, which includes the scoping and stakeholder co-design process of a National Climate Risk Assessment has been established. This will develop a shared understanding of Australia's greatest climate change risks and will provide an objective and robust evidence base for decision makers at all levels.

The Royal Commission into National Natural Disaster Arrangements[8] outlines lessons for all levels of Government to better prepare for, manage and recover from natural disasters. It concludes that the Commonwealth has the power to, and should, play a greater role in relation to disasters on a national scale. While not all coastal hazards will eventuate into disasters, the lessons from this Royal Commission are essential to reduce the potential for disaster risks. Many recommendations highlight the importance of coordination and cooperation between Commonwealth, State and Territory governments which are essential for all aspects of disaster risk reduction, response, relief and recovery.

The Royal Commission also made several recommendations on the importance of improving data and information across the country, including harmonised data governance and national data standards. The Government's response included the establishment of the Australian Climate Service (ACS). The ACS capability will more effectively collect, share and use data to develop national disaster and climate risk information for Commonwealth decision-makers.

Australia's National Disaster Risk Reduction Framework (NDRRF) guides domestic efforts to reduce disaster risks. The NDRRF aims to limit the impacts and costs of disasters to Australian communities and the economy by incorporating disaster risk considerations into planning, policies and programs.

In 2022, the Australian Government announced further agency changes and programs, including:

- National Emergency Management Agency (NEMA) established to provide end-to-end oversight on emergency management response, recovery and resilience.
- The Emergency Response Fund's $50 million Coastal Estuarine Risk Mitigation Program (CERMP) for 2022-2023. The CERMP supports projects that protect Australian coastal communities, infrastructure and ecosystems from coastal hazards. 34 nationwide projects proposed by state and territory governments were funded including construction of rock seawalls and nearshore breakwaters, large-scale beach erosion and protection, building the capacity of coastal land use planners and improving community awareness of coastal hazards.
- From 1 July 2023, the Emergency Response Fund will be replaced by the Disaster Ready Fund (DRF). The DRF will provide up to $200 million per year over five years to enable better preparedness for and prevention of disasters and reduce the impact disasters have on communities. Under the DRF, funding is expected to be matched, where possible, by state, territory and local governments.
- $22.6 million is being invested in a reform package to begin addressing insurance affordability and availability issues driven by disaster risk.

As the DRF guidelines are undergoing consultation, at this stage it is unclear how much of the DRF will be available to directly address coastal hazards.

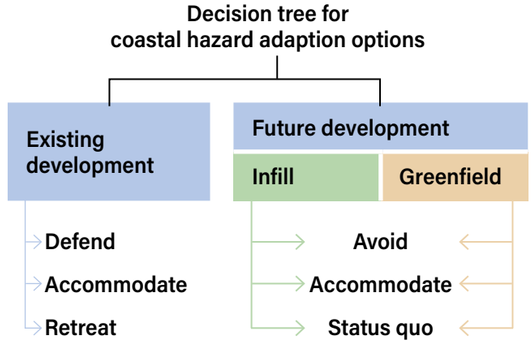
Australian Government programs to support coastal planning and management such as Caring For Our Country and the Coastal Adaptation Decision Pathways Program have previously supported State and local government led initiatives. Dedicated funding for coastal hazard management is not in scope for the current National Landcare Program, Environment Restoration Fund and Community Environment Program. The Australian Government invested over $56 million in the National Climate Change Adaptation Research Facility (NCCARF) over the period 2008 to 2018. NCCARF launched the CoastAdapt website in 2017 which can help local governments and businesses assess and respond to climate risks in the coastal zone. In 2022 the Australian Government provided $667,400 through the Disaster Risk Reduction Package to update CoastAdapt so that it will provide the latest information and how-to guidance for coastal decision-makers, including interactive tools for shoreline mapping and sea-level rise projections for each local government area across coastal Australia.

2.3 Leadership

In 2018 the Commonwealth *Senate Environment and Communications References Committee* findings of its inquiry into *Current and future impacts of climate change on housing, buildings and infrastructure* highlighted among other things:

- the limited role currently played by the Commonwealth in managing coastal risks;
- the national scale of the risk associated with climate change which requires a coordinated national approach to managing hazards in the coastal zone; and
- the limited State and Commonwealth plans or resources directed to adaptation action.

There is still a critical need for National leadership on coastal management to help provide improved collaboration between the various jurisdictions, particularly given the impacts of climate change that are already being felt across the country. The limited resources of State and local governments will not adequately address the increasing impacts of climate change on Australia's coastline. Commonwealth support is essential to provide additional resources and funding to address this critical, and time sensitive, national issue.



Example decision tree for considering coastal hazard adaption options

Victorian Coastal Wetland Restoration Program at Westernport, VIC.
Photo: Deakin University

3 Coastal hazard risk management in Australia

Mersey Point, Rockingham, WA August 2021.
Photo: City of Rockingham

State and local governments are primarily responsible for funding and undertaking coastal planning and management, including coastal hazard risk management. However, a nationally coordinated approach, involving all levels of government, would help to ensure effective strategic management and long-term sustainability of the Australian coastline.

Historically, the Australian coastal zone has largely been developed with the expectation that the shoreline will remain stable, extreme events will occur within a range defined by historical experience, and sea levels will not change. This means many coastal assets are vulnerable to future climate change [and sea level rise] depending on their location and design. Recent science shows the impacts of sea level rise are starting to be observed with increased frequency of inundation events impacting urban settings[9].

To gain a national understanding of the scale and extent of coastal erosion and inundation risk – and the cost to manage these risks – information was collated from each State and Territory (Refer to Table 2, pp. 37-42). This includes existing coastal hazard data, scale of coastal hazard risk, assets at risk (including value), current management efforts, future management needs and constraints. A summary is provided as follows.

3.1 Assessing the extent of risk

3.1.1 Coastal hazard assessment (hazard type and geographic area covered)

Coastal hazard assessments commonly identify land that may be at risk from coastal hazards such as erosion and inundation over defined planning timeframes.

Coastal hazard information was collected from existing data provided by each State and Territory. Formulating a clear national picture based on the information collected is challenging due to differing methodologies and scales (both geographically and chronologically). Some extrapolation has been applied to identify the extent of the problem nationally. The following are summary points:

- Western Australia, Tasmania, Victoria, New South Wales and Queensland have completed a statewide coastal erosion hazard investigation.
- Northern Territory, Tasmania, Victoria, New South Wales and Queensland have completed a statewide coastal inundation hazard investigation.
- Regional and local scale coastal hazard assessments for erosion and/or inundation have been completed within most States. For example:
  - In Western Australia, of 49 coastal local governments, 28 local governments are currently completing – or have completed – a hazard assessment through their coastal hazard risk management and adaptation planning.
  - South Australia has conducted several regional-scale inundation assessments, covering 57% of the coast to date, and completed local scale erosion assessments for 38 coastal settlements across 17 local government areas.
- Most States are reliant on local government to gather and access coastal hazard information to inform decision making, particularly in respect to land use planning and development.
- Of the 94 of the coastal local governments that responded to the ACCA Survey, 71 (75%) have undertaken a coastal hazards risk analysis in the last five years.

3.1.2 Other State and national coastal hazard risk information collected

A range of other coastal hazard risk information and baseline data sources have been collected. Most are local or regional level and the methodologies vary. These include:

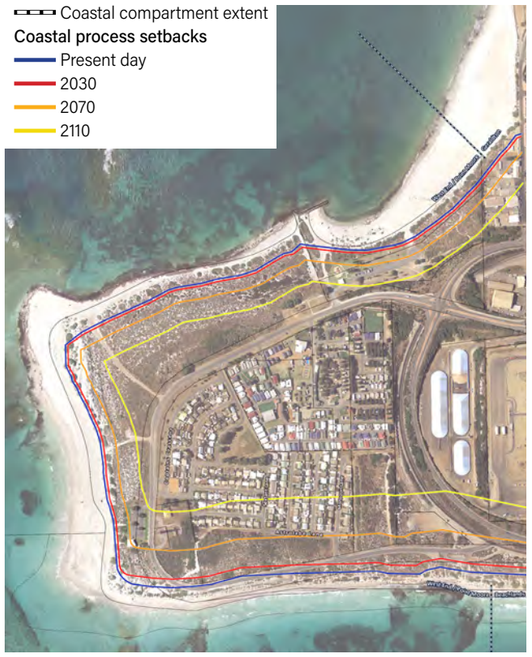
- Light Detection and Ranging (LiDAR) bathymetric and terrestrial surveys for digital elevation models.
- Coastal hazard risk management and adaptation plans or equivalents.
- Regional climate change adaptation plans.
- Tools developed to calculate exposure based on hazard extent.
- Coastal monitoring and beach profile data.
- Monitoring programs to project future changes to coastlines (such as the Victorian Coastal Monitoring Program[10]).
- National coastal landform map data (Smartline, Coastal Compartments, Digital Earth Australia Coastlines).

3.1.3 Other coastal hazard risk information still needed

Coastal hazard risk information, at a relevant scale, is an essential basis for good coastal decision making. To date, considerable work has been completed by State and local governments (refer to 3.1.1).

In some instances, while relevant data has been collected, the identification and implementation of adaptation responses remain outstanding. There are also some areas that require studies or assessments to identify the current and future extent of coastal hazards. The Coastal Hazards Working Group has identified the following gaps in important coastal hazard risk information in some areas:

- Hazard mapping to identify the spatial extent and location of coastal areas at risk from current hazards and potential future climate change.



Coastal erosion hazard map, Point Moore, Geraldton, WA.
Photo: City of Greater Geraldton

- Geotechnical assessments for high priority areas to inform engineering solutions and management decisions.
- Detailed coastal hazard risk management and adaptation plans or equivalents (hotspot specific) that provide adaptation responses.
- Regular monitoring of beach profiles and shorelines to understand the beach volume fluctuations and trends over management timescales (annual to decadal and beyond).
- High resolution nearshore wave and water level modelling and monitoring to understand ocean and climate forcing of coastal hazards.
- Improve data on sediment types and volumes to better understand sediment budgets and geological controls.
- Availability of suitable sand and rock for nourishment and hard protection.

Additionally, improved and regularly updated data on built (buildings and infrastructure) and natural assets would greatly improve the understanding and quantification of exposure to coastal hazards. This should include collection of data on building and infrastructure types, footprints and floor levels, as well as improved mapping of coastal habitats.

3.1.4 What are the constraints?

The Coastal Hazards Working Group identified constraints to collecting outstanding coastal hazard risk information. These constraints are also important to identifying and implementing adaptation responses and ultimately building resilience to coastal hazards. Key constraints include:

- Limited funding and resourcing, including relevant expertise.
- Competing priorities.
- Community perceptions and a general lack of understanding, particularly in respect to the significance of investment in coastal protection, the circumstances where beneficiary pays approaches to funding are appropriate, and the trade-offs between market and non-market coastal values.
- The challenge of dealing with long-term risk within current planning and management frameworks.
- Limited Commonwealth direct support for on-ground or local coastal adaptation.

3.1.5 Timeframe

There are two approaches to timeframes, one for the management response and one for the projected impact of coastal hazards.

Management response:

- 0-5 years (imminent)
- 5-25 years (expected)
- 25+ years (projected)

This example of management response is taken from the Assessment of Coastal Erosion Hotspots in Western Australia report (2019).

Projected impact (hazard assessment):

> A 100-year planning timeframe is typically used, with two or three interim projections. For example, in Western Australia coastal hazard risk management and adaptation plans typically assess the current year and projected years such as 2030 (10 years), 2050 (30 years), 2090 (70 years) and 2120 (100 years).

3.2 Quantifying the problem

3.2.1 Scale of coastal hazard risk

It is difficult to determine the length of Australian coastline impacted by coastal hazards. Not all States or Territories have completed high level hazard assessments, and projected sea level rise values vary between each jurisdiction. However, datasets such as the *National Exposure Information System* (NEXIS) *and Digital Earth Australia Coastlines* published by Geoscience Australia could be used to more accurately quantify the proportion of Australian coastline at risk of coastal hazards.

The ACCA coastal hazards survey identified at least 268 current hotspots within the 94 local governments that responded, representing only 40% of all coastal local governments. Taking Western Australia as representative, 23 of 49 (47%) local governments responded to the survey identifying 43 hotspots. While a State Government assessment has identified 55 erosion hotspots with additional 31 watch list locations, indicating that the survey result underestimates the scale of the problem. A national assessment would reveal significantly more current coastal hazard hotspots and provide an accurate picture.

Infrastructure Australia recognised coastal hazard risks as a nationally significant infrastructure problem that meets the economic threshold value of $30 million per year in material net benefit and identified development of a national Coastal Hazards Adaptation Strategy as a high priority initiative in the 0 to 15-year timeframe[11].

3.2.2 Assets at risk

The primary asset category assessed by the States for coastal hazard risk is residential properties. Other asset categories include road and rail, services, natural values, Aboriginal cultural values, recreation, and public amenity, use and access. It is difficult to determine at a national scale the impact of coastal hazards on assets as not all States or Territories have assessed this, and those that have, used varying timeframes and methodologies. For example:

- Within the next 80 years, by 2100, New South Wales will potentially have 3,500 lots (6,800 total addresses) vulnerable to erosion[12]. A further 50,744 properties are vulnerable to inundation with one metre of sea level rise, and 74,739 properties vulnerable to 1.5 metres sea level rise[13].
- By 2100, Tasmania will potentially have 3,788 houses vulnerable to erosion and 3,152 houses potentially vulnerable to a 1% AEP (Annual Exceedance Probability) storm surge event[14].
- Victoria has identified 6,118 hectares of residential property with high to very high coastal erosion vulnerability ratings with 0.82m sea level rise, and between 31,000 and 48,000 residential properties (13,410 hectares) impacted by storm surge at 0.82m sea level rise[15].

Previous national estimates indicate that the number of assets at risk from the combined impact of inundation and erosion at a sea level rise of 1.1 metres (high end scenario for 2100)[2] include:

- 187,000 - 274,000 residential buildings
- 5,800 - 8,600 commercial buildings
- 3,700 - 6,200 light industrial buildings
- 26,000 - 33,000 kilometres of roads
- 1,200 - 1,500 kilometres of rail lines and tramways

These estimates are conservative as they do not include all public infrastructure at risk from coastal hazards and they measure impact on existing or approved development. They do not estimate the extent of any additional development in these 'at risk' areas over time hence, the number and value of assets at risk by 2100 are likely to be considerably greater.

3.2.3 Value of assets at risk

- National figures from the supplement to the National First Pass Assessment (2011)[2] estimate that greater than $226 billion in commercial, light industrial, road and rail, and residential assets are potentially exposed to inundation and erosion at a sea level rise of 1.1 metres (high end scenario for 2100). This includes residential buildings estimated to be worth between $51 and $72 billion (2008 replacement value). This is a conservative estimate as it does not include consideration of critical infrastructure such as hospitals, or infrastructure involved in the delivery of some essential services such as wastewater systems; nor does it include natural values or cultural heritage values associated with Aboriginal sites, coastal middens and archaeological digs. The Coastal Hazards Working Group recommends an update of the First Pass National Assessment to include more recent national data sources, as well as assessments completed by State and Territory governments. The update should identify the exposure of different assets to coastal hazards and assess the costs associated with addressing the problem.
- Tasmania has calculated the value of assets (residential structures) potentially exposed to coastal erosion and inundation. By 2100, it is estimated that more than $1.5 – $2 billion of residential structures will be exposed to erosion risk, and $1.2 billion of residential structures will be exposed to inundation risk [2013 valuations, 0.82 – 0.92m sea level rise][14]. The National First Pass Assessment estimated that replacement value of residential buildings at risk from inundation in Tasmania was $2.4 – $3.3 billion [2008 valuations, 1.1m sea level rise].
- Victoria has calculated the total value of residential assets at risk from inundation by 2100 to be between $6.5 – $10.3 billion [0.8m sea level rise][16].
- New South Wales has estimated annual costs from property damage and loss of land associated with increased erosion and inundation associated with sea level rise will cost between $850 million and $1.3 billion (real 2019-20 dollars) by 2061 depending on the climate scenario[17].

These cost estimates do not account for the potential for policy interventions, which could include either mitigating damage to existing structures or limiting the exposure of additional structures, for example through development controls.

3.3 Management

3.3.1 Coastal planning and management legislation and structural arrangements

Strategic coastal planning is more commonly the responsibility of the State and Territory governments. Generally, State and Territory governments are responsible for policy making through planning policies, while implementation is a joint responsibility of both State and local governments, and development decisions are often delegated responsibilities of the respective local government.

In key policy areas, and some significant policy measures, the Commonwealth has contributed significantly, including through climate information and research as well as major funding programs such as *Caring For Our Country, Coastal Adaptation Decision Pathways Program* and the online CoastAdapt tool.

Table 1 shows the legislation and structural arrangements for coastal planning and management in each jurisdiction of Australia. The following are summary points:

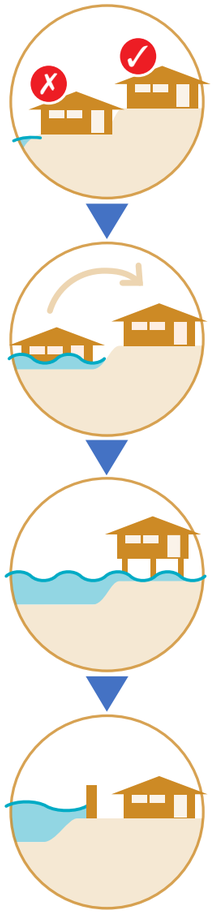
- South Australia, Victoria, New South Wales and Queensland each have a specific Act of Parliament for coastal protection or management. These Acts include a requirement for preparing coastal management plans, programs, policies or strategies.
  - Tasmania does not have a specific Act, but there is an Act that validates the State Coastal Policy.
  - Western Australia has a specific coastal State Planning Policy (2013), established under the *Planning and Development Act 2005*.
  - Northern Territory has a *Coastal Waters Act 1980* (amended 2008) that defines the extent of terrestrial sea and coastal waters, but does not have a specific coastal planning and management Act or policy.
  - South Australia, Victoria and New South Wales have a statutory body in the form of a Coastal Board or Council.
- All jurisdictions have statutory instrument(s) that govern development control, and this is most commonly through Local Planning Schemes.
- All jurisdictions have a coastal strategy and planning policy, or policies.
- All jurisdictions have guidelines relevant to coastal planning and management.
- State agency resources vary from 1 to 25 full time employees (FTE). Nationally, the total number of State resources working on coastal planning and management is estimated to be 108 FTEs.
- All jurisdictions except the Northern Territory operate some form of coastal grants program. Annual grant funding for coastal planning and management varies significantly between States, with the lowest allocation being $1.6 million and the highest $16.7 million (based on 2020/21 financial year funding).

- Local governments are predominantly responsible for local planning and implementing coastal management and adaptation options in all jurisdictions. Typically, State grants programs require matched funding, hence an assumption can be made that local governments are at a minimum spending the same as State Governments.
- State agencies play a significant role in managing conservation reserves and waters within marine reserves.
- Ministers responsible for coastal planning and management typically oversee other portfolios such as planning, local government and the environment.

Australia is well served by a multitude of State and local coastal planning and management policies and guidelines. While the aims and broad objectives are often comparable, there is significant variation. These inconsistencies can lead to unstable policy positions that are shaped by changes in Government. A nationally agreed Coastal Management Framework and Principles, developed with input from all levels of government, recognising existing State and Territory policies and highlighting the underlying consistencies, could lead to greater stability and efficiencies.

3.3.2 Adaptation responses or actions

- High level coastal adaptation responses (non-intervention, avoid, retreat, accommodate or protect) are established by the States through policy.
- Local strategies include more detailed adaptation responses or actions. For example, updates to local planning schemes to include special control areas, relocation of infrastructure, sand nourishment, and protection works (such as groynes or seawalls).
- Local governments are responsible for preparing their own adaptation strategies, consistent with State policies and guidelines.



Avoid
identify future 'no-build areas' and use planning tools to prevent new development in areas at risk now or in the future

Retreat
withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise

Accommodate
continue to use the land but accommodate changes by building on piles, converting agriculture to fish farming or growing food or salt-tolerant crops

Protect
use hard structures (eg sea walls) or soft solutions (eg dunes and vegetation) to protect land from the sea. May be prohibitively expensive, especially in the long term

(Adapted: Cardno 2018a)

Example risk management and adaptation hierarchy.
Image: Cardno

3.3.3 Estimated cost of adaptation measures

The national cost to adequately manage coastal hazards is estimated to be in the vicinity of between $183 million and $350 million per year, for the next 5 years. These figures were estimated by extrapolating results from the 2020 local government coastal hazards survey, conducted by the ACCA[5]. Higher and lower cost estimates for the next 5 years were calculated from the survey results. These estimates were divided by the number of local governments that responded (62). These figures were then multiplied by the number of coastal local governments in Australia (238), then divided by 5 to calculate annual lower and higher estimates.

Western Australia and South Australia have developed statewide cost estimates of adaptation measures:

- In Western Australia, estimated funding of $9 – $22 million per year is needed to manage erosion hotspots within the State, in the 0-5-year timeframe. A five-year cost estimate is between $45 –$110 million. This is over and above current day to day coastal reserve management.
- In South Australia, the total 10-year erosion cost estimate is $149 million★, made up of the following:

  Regional erosion management:

  - Council-led projects (including grant assisted)
  - Total cost of 2019/20 projects = $1.7 million
  - Conservatively extrapolated over the next 10 years = $17 million.

  Adelaide's managed beaches:

  - Current management costs = $6 million per annum
  - Current infrastructure delivery = $48.4 million (2019-2023)
  - Additional future management costs = $3 million per annum (from 2023)
  - 10-year total (to 2030) = $132 million.

★ Figure determined from 2020/21 grant funding estimates.

3.3.4 Coastal planning and management funding

Currently, State and local governments are primarily responsible for the majority of spending to manage Australia's coastline. State Governments are currently spending more than $48 million annually on coastal planning and management activities. Local government expenditure on coastal planning and management activities is estimated to be significantly higher, ranging between $90 million and $227 million per year[5]. This represents a combination of local government funds and any external funding such as State Government grants.

The Australian Government plays a significant role in advancing climate research and information. Previously it has also played a significant role in coastal planning and management through programs including Caring For Our Country, Coastal Adaptation Decision Pathways Program and funding of the online CoastAdapt tool. In 2022 the Australian Government provided new funding through the $50 million Coastal and Estuarine Risk Management Program for the 2022-23 financial year. From 1 July 2023 the new Disaster Ready Fund will provide up to $200 million per year to support investment in community and state- based resilience projects.

In general, it is often considered that private businesses and land owners are responsible for managing risks to their assets and incomes by developing and implementing strategies to manage climate change impacts[7]. However, in complex risk situations some level of coordinated response may be required. With respect to coastal management, coordinated and integrated planning and delivery of contemporary best practice solutions is essential. Independent action to manage risk can transfer coastal hazards to threaten nearby beaches and assets, and significantly reduce beach amenity and public access. Hence, uncoordinated and unregulated action by private parties is inappropriate.

4 Opportunities for national collaboration

Top: **WA Coastal Awards for Excellence 2017, presented by Hon. Rita Saffioti MLA (front centre).**
Photo: WA Department of Planning, Lands and Heritage

Middle: **Karajarri Rangers and volunteers, seagrass workshop, Broome, WA.**
Photo: Broome Community Seagrass Monitoring Project

Bottom: **Wattle Range Council, SA. Climate Leaders Award 2018.**
Photo: SA Department for Environment and Water

Generally, collaboration between State and local governments is strong, but as the impact of climate change on coastal areas, communities and assets grows, the need for collaboration between States increases and the Commonwealth can play a significant role in facilitating a coordinated approach. The need for collaboration nationally has been previously identified (Refer to Sections 4.1 and 4.2). This report seeks to highlight and address how this could be improved.

Discussions amongst the Coastal Hazards Working Group have confirmed previous conclusions and highlighted the increasing coastal hazard risks and urgency of the need for action. Strategic collaboration will produce financial and temporal economies and long-term, sustainable public benefits. There are many benefits of national collaboration on coastal hazard risk management. These have been grouped into key themes and presented below (Refer to Sections 4.3 to 4.7).

4.1 Development of national policy considerations of climate change adaptation and coastal management

Since 2006, successive Commonwealth Governments have recognised the importance of national collaboration to address the climate change challenges for coastal management. The 2012 COAG *Position Statement on the Roles and Responsibilities for Climate Change Adaptation in Australia* states that a foundation for building successful risk management is by recognising and empowering those who are best placed to manage them. It covers the various roles between the Commonwealth, states and territories, local governments and industries. It describes the Commonwealth Government as responsible for providing national science and information; leadership on national adaptation reform; managing Commonwealth assets and programs; and a strong, flexible economy and well-targeted social safety net. This provides a broad framework, but as the policy noted, it did not attempt to address issues of resourcing and capacity. Given the statement is nine years old it is timely and appropriate it be reconsidered, particularly in light of the increasing frequency of impacts from coastal hazards. This report provides the opportunity for the specific details on coastal management and hazards to be determined, considering the broad 2012 COAG roles and responsibilities[7].

Various National level forums and reports have recognised the physical impacts of climate change on the coasts which warranted National attention and coordination. A number of key National policy milestones and initiatives regarding climate change adaptation and coastal management have been implemented.

In 2006, the Natural Resource Management Ministerial Council adopted the *National Cooperative Approach to Integrated Coastal Zone Management; Framework and Implementation Plan*. The Plan identifies priorities for integrated and coordinated actions to address coastal management issues that are of national scale or scope, or where issues will benefit from complimentary arrangements between jurisdictions.

The *Climate Change Risks to Australia's Coast: A First Pass Assessment* prepared by the Commonwealth Department of Climate Change in 2009 provided the first National assessment of the risks of climate change for the Australia's coastal zone. It identified:

- areas at high risk to coastal hazards, particularly settlements and ecosystems;
- impediments to effective responses to these impacts; and
- National priorities for adaptation in the coastal zone.

In 2011, a supplementary analysis report *Climate Change Risks to Coastal Buildings and Infrastructure* provided additional data on exposure, concluding that exposure of coastal assets to sea level rise associated with climate change is widespread across Australia's coastline, with the hazard expected to increase in the future.

The National Climate Change Adaptation Framework adopted by COAG in 2006 noted that adaptation is the principal way to deal with the unavoidable impacts of climate change. The goal of the framework was to position Australia to reduce the risks of climate change impacts, and realise any opportunities, and included strategies over 5-7 years to build capacity to deal with climate change impacts and reduce vulnerability in eight key sectors and regions, including coastal regions.

The Commonwealth Position Paper *Adapting to Climate Change in Australia* released in 2010 set out a National vision and steps for adapting to the impacts of climate change. It identified six initial National priorities for adaptation action, which included coastal management. Subsequently, the same year, the Commonwealth released its' response to the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts Report *Managing our coastal zone in a changing climate: the time to act is now*. The report made 47 recommendations. Recommendation 39 was that the Commonwealth give consideration to establishing a separate funding program for infrastructure enhancement in coastal areas vulnerable to climate change.

The Commonwealth commissioned the Productivity Commission to undertake an *Inquiry into the Barriers to Effective Climate Change Adaptation* which was released in March 2013. The Commission's Inquiry addressed existing settlements and recommended that COAG should:

> *commission an independent public inquiry to develop an appropriate response to managing the risks of climate change to existing settlements, including to identify the options to manage climate change risk to these assets and their benefits and costs* [Recommendation 11.1].

The Commonwealth noted the Productivity Commission Final Report and agreed that managing the risk of climate change to existing settlements was a significant issue that required cross-jurisdictional cooperation and further investigation.

The Commonwealth Senate Environment and Communications References Committee inquiry into *Current and future impacts of climate change on housing, buildings and infrastructure* in August 2018 had similar findings, and also found that there was a lack of on-the-ground adaptation and a need for greater expenditure on pre-disaster resilience. The Commonwealth is currently considering its response to the Committee following the Government's response to the Royal Commission.

The *Royal Commission into National Natural Disaster Arrangements* (2020) outlines lessons for all levels of Government to better prepare for, manage and recover from natural disasters. It concludes that the Commonwealth Government has the power to – and should – take a greater role in relation to disasters on a national scale. Many of the recommendations from the Royal Commission highlight the importance of coordination and cooperation between Federal, State and Territory governments, which is essential in all aspects of disaster risk reduction, response, relief and recovery.

Through independent assessments, Infrastructure Australia has also confirmed that increasing coastal hazard risks warrant the need for action, listing it as a high priority initiative.

These findings are further supported by the findings in this current report. The scale of the challenge, and the potential risks and consequences of coastal hazards in terms of damage to assets, settlements, ecosystems, and the economy warrant a national collaborative approach.

4.2 Commonwealth investment on coastal planning and management

The Commonwealth provides substantial levels of funding to the States in key sectors such as health, education, community services, infrastructure, emergency management and resilience and continues to support important productivity-enhancing projects and reforms. In aggregate, the Commonwealth government payments to the States is estimated to be $127.4 billion in 2019/20★.

With $58.3 billion in payments for set purposes, including National Specific Purpose Payments, National Health Reform, the National Housing and Homelessness Agreement and Quality Schools funding, and new agreements for the Community Health, Hospitals and Infrastructure projects and disaster risk reduction.

There is a strong alignment of coastal planning and management with investment in infrastructure priorities and disaster risk reduction including coastal hazard events. It is important to recognise that coastal hazards are not solely acute, as with most other natural disasters, but predominantly the result of chronic conditions and past management or planning decisions. Hence, coastal hazard risk management should be funded accordingly.

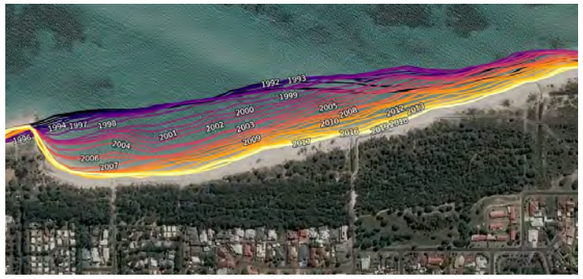
★ 2019/20 figures were sourced from: Budget Papers, Part 1 Australia's Federal Relations, p. 3, https://budget.gov.au/2019-20/content/bp3/download/bp3_01_states.pdf. The 2020/21 budget figures have not been used due to COVID-19 creating an atypical year in budget expenditure.

4.3 Funding and resourcing

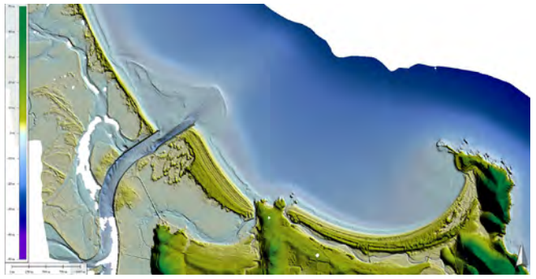
- A National funding program to support coastal hazard risk management is needed to address the gap between the growing cost of coastal management and adaptation, and the funds available through State and local government budgets This could include funding for risk assessment, planning, monitoring, education, communication and adaptation action. This program could be modelled on the existing Disaster Risk Reduction funding package and associated National Partnership agreements [administered by the National Emergency Management Agency], and/or the Environment Restoration Fund, the Communities Environment Program, and the National Landcare Program [Department of Climate Change, Energy, the Environment and Water].
- Improving coastal planning across Australia and establishing a consistent approach to avoid future costs from hazards and to reduce disaster risk. For example, assessing the costs of inaction; and developing evidence to support coastal managers and communities to take the most constructive steps early, with the intention to invest now to avoid future liability and minimise the need for future disaster losses and costly recovery responses.

4.4 Data collection

- National and Statewide climate change projections, process modelling, monitoring programs (such as the Bureau of Meteorology Seaframe wave measurements). These must be at a scale relevant to inform local coastal hazard risk management and adaptation plans. This is consistent with the *Royal Commission into National Natural Disaster Arrangements* which recommends Australian, State and Territory governments produce downscaled climate projections.
- Research into coastal processes and the effect of climate change on coastal hazard risks, including the changing likelihood and impact of compound flooding events in estuarine areas.
- Hazard and impact mapping of rapid and incremental change, including use of remote sensing data (for example, Digital Earth Australia Coastlines product published by Geoscience Australia).
- Gaps in coastal hazard risk information have been identified (Refer Section 3.1.3).
- Include engagement of local communities through citizen science programs to monitor coastal erosion and flooding, such as implemented by the Victorian Coastal Monitoring Program[10].



The national Digital Earth Australia Coastlines dataset illustrates the position of the mean sea level coastline for each year of Landsat record (1988 to present). Busselton, WA.
Image: Geoscience Australian



High resolution sea bed mapping of the Trial Bay/Macleay River Entrance area, NSW.
Image: NSW Department of Planning, Industry and Environment

4.5 Information sharing and capacity building

- Developing opportunities for coastal managers and planners from different jurisdictions to learn from each other's experience.
- Coordinating sharing of information and experience about hazard assessment, planning and management including decision support tool platforms such as CoastAdapt.
- Collaborating and building more effective approaches to work with coastal communities to develop their understanding of the risks, preparedness, and consideration of all adaptation options. This can include engagement of local communities through citizen science programs to monitor coastal erosion and flooding, such as implemented by the Victorian Coastal Monitoring Program[10].
- Coordinating measures and investment to improve capacity building, involvement and collaboration of local councils and other local coastal managers to improve effectiveness of planning and implementation of adaptation.
- Capacity and capability building for financial management, land use planning, building and construction, emergency management, and community resilience professionals.

Coastal hazard risk management and adaptation planning forum, November 2015, Perth, WA.
Photo: WA Department of Planning, Lands and Heritage

4.6 National standards

- Incorporate a nationally consistent risk-based approach to planning for sea level rise and coastal hazard events.
- Set nationally consistent building and construction codes and standards for coastal areas.
- Defining and communicating clear minimum standards and expectations for management of coastal hazards.
- Consistent guidance for coastal managers, users and communities.
- Encourage and use standard definitions for erosion hazard and risk categories and terms so that reporting can be more consistent and useful for reporting.

4.7 Other opportunities

- Liaison and collaboration with Infrastructure Australia in developing the Infrastructure Priority List initiative for a Coastal Hazards Adaptation Strategy.
- Liaison and collaboration with Insurance Council of Australia to develop an insurance industry position statement on understanding actions of the sea (such as coastal erosion and inundation).
- Improve community and stakeholder engagement and education when developing adaptation options, including consideration of planned or managed retreat.
- Build community preparedness and resilience in dealing with immediate and ongoing impacts of coastal hazards.
- Legal liability associated with coastal adaptation action or inaction continues to be a matter of concern for State and local governments. Further work is required to better scope and clarify this issue.

5 Recommendations

Implementation of the following recommendations is required to collaboratively and strategically address coastal hazards at a national level supported by appropriate funding.

	RECOMMENDATIONS
1	**Develop a National funding program** to support local and regional coastal hazard risk management, including the areas of essential data, risk assessment, planning, adaptation actions, monitoring, education and communication. This program could leverage existing Commonwealth programs and initiatives and should complement State and local government coastal planning and management funding.
2	**Develop a nationally agreed Coastal Management Framework and Principles**. A broad high-order integrated coastal management vision, goal and principles. To include recognition of State and Territory coastal planning and management policies, approaches for guiding risk based decision-making, and consideration of climate change scenarios and sea level rise.
3	**Develop a national Coastal Hazards Adaptation Strategy**, such as the priority project identified by Infrastructure Australia. The strategy will establish a national approach to coastal hazard management, setting an agenda for integrated and coordinated national action to address and manage coastal hazards over the next 15 years. An intergovernmental group such as the Coastal Hazards Working Group should be established and resourced to support the development of the Strategy and assist in implementing its recommendations or actions. Development of the strategy could be led by the Commonwealth, potentially the Department of Climate Change, Energy, the Environment and Water.
4	**Support improved community and stakeholder engagement and education**. Adaptation strategies require the engagement and support of the broader community. Aboriginal Australians should be supported to determine how their rights and obligations are embedded in planning and management. Educating landowners and developers is important to ensure they are aware of possible constraints that may affect the use of their land. Promote the identification and collection of community values (e.g. natural and cultural), sharing of risk information, risk allocation (such as risk tolerance), determination of adaptation options and responsibilities to facilitate informed engagement in the difficult decisions that some communities will need to make in the future (e.g. planned or managed retreat).
5	**Build the capacity of coastal decision-makers**. Support coastal managers to undertake appropriate local coastal hazard risk management planning to enable informed decision-making, through provision of guidance and training. Continue to support and update information tools such as CoastAdapt. For example, to increase understanding of coastal hazards and to ensure that adaptation investments use robust methods to determine if, when and how to adapt within the context of dynamic coastal environments. Support the national Coast to Coast Conference as an important forum for sharing knowledge, expertise and experience, including contributions from all levels of Government.
6	**Update of the *Climate Change Risks to Australia's Coast: A First Pass National Assessment*** (2009 and 2011) to identify the exposure of different assets to coastal hazards (i.e. a second pass national assessment) and assess the costs associated with addressing the problem. Develop a national audit of critical infrastructure, natural and cultural assets within the coastal zone, and determine their potential exposure to coastal hazards. National data sources such as the National Exposure Information System (NEXIS) and Digital Earth Australia (DEA) Coastlines may assist with this work.

6 Conclusions

Storm surge Colloroy Beach NSW, June 2016.
Photo: NSW Department of Planning, Industry and Environment

Coastal hazards are widespread in Australia, impacting all State and Territory jurisdictions and most coastal local governments. With more than 80% of Australia's population living within 50 kilometres of the coast, coastal hazards are a significant national issue that threatens more than $226 billion of public and private infrastructure within the next 70-80 years. This is a conservative estimate that does not include consideration of cultural heritage or natural values, critical infrastructure such as hospitals, or essential services infrastructure. It is also ten years old, and the situation has not improved and the extent of the problem and cost to act will have increased.

Climate change is exacerbating and accelerating the impacts of coastal hazards on our coastal communities. A significant funding and investment shortfall between the costs of coastal management and planning, and the available funds across governments is a key issue.

Over the last 10-15 years, Governments at all levels have acknowledged the severity of the issue and the need for a coordinated national approach arising from a number of reports, inquiries and policy initiatives. More than ever, National leadership and engagement from public and private sectors is essential to address and manage coastal hazards. Coastal adaptation action needs to be prioritised as part of the Commonwealth's action on national disaster risk management and climate change.

Environment Ministers have tasked the States and Territory Governments to quantify the problem. Since making that decision, Infrastructure Australia has recognised coastal inundation and erosion as a strategic matter of high importance on its Infrastructure Priority List, and by inclusion on the Australian Infrastructure Plan. It is crucial that the national Coastal Hazards Adaptation Strategy proposed by Infrastructure Australia and a recommendation of this Report is prepared to enable coordinated and integrated coastal hazard risk management. Further consideration needs to be given to how the Strategy would be coordinated, and how it links to other national strategies such as the National Climate Resilience and Adaptation Strategy 2021-2025 and the National Disaster Risk Reduction Framework. The identification of an Australian Government agency to lead the project, in collaboration with the Coastal Hazards Working Group, or a similar technical intergovernmental body is required.

The most important and urgently needed recommendation of this report is the development of a National funding program to support coastal hazard risk management. It will enable coastal managers to undertake local and regional coastal hazard risk management planning, and to identify and implement the most strategic, effective and efficient adaptation responses to current and future coastal hazard threats.

It will also assist in building the capacity of coastal decision-makers by increasing their understanding of coastal hazards, building community education and resilience and help facilitate informed discussions on the difficult decisions that some communities will need to make in the future.

While State and in particular local governments are facing the issues on the ground, without additional effort and funds the problem will worsen. The timeframe in which coastal hazards seriously threaten much of Australia's coastline, adjacent properties and public values will accelerate resulting in significant negative social, cultural, economic and environmental impacts. For example, reduced tourism, failed road and services infrastructure and loss of coastal property, private and public assets.

Shoreham Road 1985 (top), 2018 (bottom), Brighton, SA.
Photos: City of Holdfast Bay

A shellfish reef breakwater for erosion control being seeded with native mussels at Portarlington, Port Phillip Bay, VIC.
Photo: Reg Ryan

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Table 1: Australian Coastal Management Legislation and Structural arrangements

(last updated February 2021)

		WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
LEGISLATION	COASTAL PROTECTION	Nil	• *Coast Protection Act 1972* (establishes the Coast Protection Board) • *Coast Protection Regulations 2015*	No specific Act. *State Coastal Policy Validation Act 2003* validates State Coastal Policy 1996 (minor revision 2009), which is made under the *State Policies and Projects Act 1993*. State Policies have broad and overarching powers.	*Marine and Coastal Act 2018*. Regulations (*under the Marine and Coastal Act 2018*) are being developed for use, development and works on marine and coastal Crown land.	• *Coastal Management Act 2016*	• *Coastal Protection and Management Act 1995* • *Coastal Protection and Management Regulations 2017*	• *Coastal Waters (NT Powers) Act 1980 (amended 2008)*
	OTHER PRIMARY	• *Planning and Development Act 2005* • *Planning and Development Regulations 2009* • *Planning and Development (Local Planning Schemes) Regulations 2015* • *Environmental Protection Act 1986*	• *Planning, Development and Infrastructure Act 2016* • *Landscape South Australia Act (2019)*	• *Environmental Management and Pollution Act 1994* • *Land Use Planning and Approvals Act 1993* • *State Policies and Projects Act 1993.* • *Coastal and Other Waters (Application of State Laws) Act 1982* • *Coastal Waters (State Powers) Act 1980*	• *Planning and Environment Act 1987* • *Catchment and Land Protection Act 1994* • *Environment Protection Act 1970* • *Climate Change Act 2010* • *Crown land (Reserves) Act 1978* • *Land Act 1958* • *Great Ocean Road Coast and Parks Authority Act 2020* • *National Parks Act 1975* • *Parks Victoria Act 2018* • *Port Management Act 1995* • There is a range of other legislation that intersects/affects marine and coastal planning and management (see Appendix 2 on p. 80 of the Victorian Marine and Coastal Policy 2020) • *Planning and Environment Regulations 2015*	• *Marine Estate Management Act 2014* • *Environmental Planning and Assessment Act 1979* • *Environmental Planning and Assessment Regulation 2000*	• *Planning Act 2016* • *Sustainable Planning Act 2009* • *(replaced by Queensland Planning Act in 2016)*	• *Planning Act 1999 (amended 2020)* • *Planning Regulations 2000 (amended 2020)* • *NT Planning Scheme 2020*

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
STATUTORY INSTRUMENTS - DEVELOPMENT CONTROL	Development control is via Local Government Local Planning Schemes (LPSs). Local governments must have due regard for State Planning Policies (SPPs) in making and amending LPSs, and considering development proposals. The State Administrative Tribunal must also have due regard for SPPs. LPSs must also reflect the State Planning Strategy. While there are no standard mandatory or deemed LPS provisions for coastal protection, it is proposed to amend the Planning and *Development (Local Planning Schemes) Regulations 2015* to include Foreshore Reserve and related objectives into the model provisions (ie. not the deemed provisions).	The relevant authority for development applications can either be local Council or the State Commission Assessment Panel (SCAP) which administer the development assessment process required under the *Planning, Development and Infrastructure Act 2016*, the Planning and Design Code (the Code) is a single planning rulebook for assessing all development applications in the State. The Code includes 'overlays' that cover coastal areas. All development applications referred to the Board are for direction. A 'Code Amendment' is the process for future land use policy review under the legislation.	Development control is via Local Government Planning Schemes which must be consistent with State Coastal Policy. Current planning schemes follow a mandated template setting out zones that can be used but does not include mandatory codes and overlays. The Government is introducing a state-wide single planning scheme (the Tasmanian Planning Scheme) which includes mandatory codes and overlays covering coastal issues such as inundation and erosion and coastal refuge areas. The Scheme will be introduced progressively across the state over the next 12-18 months as each council prepares and has approved its Local Provisions Schedule which spatially applies the State Planning Provisions	• The *Marine and Coastal Act 2018* requires ministerial approval for all use, development and works on marine and coastal Crown land (96% of the foreshore in Victoria is Crown land). • The Marine and Coastal Policy 2020 guides decision makers in the planning, management and sustainable use of the coastal and marine environment. It includes a Marine Spatial Planning Framework to guide long-term planning and management of Victoria's marine environment in an integrated and coordinated way. Policies apply to 'marine and coastal environment' and/or 'marine and coastal Crown land' as defined in the Act. Policies included in the planning provisions also relate to private land. • The *Marine and Coastal Act 2018* provides for a number of statutory instruments at the local, regional and state-wide scale. • The Victoria Planning Provisions (VPP) are mandatory state-wide provisions for planning schemes that incorporate the State Planning Policy Framework (SPPF). The SPPF includes coastal areas and the need to have due regard to the Marine and Coastal Policy and national park legislation. The VPP reflects the Marine and Coastal Policy 2020. • Local Government is the responsible authority for administering planning permits through Local Planning Schemes. When preparing amendments to schemes and making decisions, the SPPF must be taken into account and effect given to the policies.	The State Environmental Planning Policy (Coastal Management) 2018 identifies development controls to help protect and manage sensitive coastal environments and risks from coastal hazards, in addition to supporting appropriate development. Under Coastal Management Act, LGs may (or must if directed by the Minister) prepare a Coastal Management Program. The Program may include actions to update coastal zone maps in the SEPP or apply other land use planning (eg.zoning or development setbacks) in Local Environment Plans or development controls (eg. Minimum floor levels or building foundations) in Development Control Plans.	Development control is via Local Government Planning Schemes. The Queensland Planning Provisions (QPP) are state-wide standard provisions that schemes must be consistent with. The QPP does not contain standard provisions or codes regarding coastal management, however enables use of overlays and corresponding provisions for particular issues. The Minister for Planning can require overlays relating to coastal issues in order to ensure a new scheme complies with the State Planning Policy (see below) relating to coastal issues.	The administration of the planning laws is the responsibility of the Minister. The Minister, along with the Development Consent Authority (DCA), are the two main decision makers in the NT planning system. The Minister makes all decisions in relation to proposals to amend the Planning Scheme, including the introduction of strategic land-use plans, planning policy and changes to zones or development assessment rules. The DCA considers applications on zoned land for development that require approval while the Minister is the authority for applications on zoned coastal land outside of DCA responsibility. Of the seven divisions of the DCA in the NT, only Darwin, Palmerston, Katherine and Litchfield divisions make decisions on proposals involving the coastline. The NT Planning Commission is responsible for consulting on and preparing integrated strategic land-use plans, guidelines and assessment criteria for the Minister to consider for inclusion in the NT Planning Scheme. Local Councils are responsible for municipal services and infrastructure including maintenance of the portion of the coastline that is under Council ownership. Local Councils do not make decisions on planning proposals, however the laws require that local councils are provided with the opportunity to make a submission on planning proposals on zoned land in their local government area.

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
TENURE OF COAST	>75% is Crown tenure	It is estimated that approximately 95% of coastal foreshore is Crown Reserve ((either 'dedicated' (e.g. to Council) or 'unalienated').	About 75% of the Tasmanian coast is in Crown tenure.	About 96% (more than 2,400 km) of Victoria's 2512 km coastline is reserved as Crown land. The remainder of coastal land is freehold owned by local government and about 200 private landowners. Native title is held over extents of crown land areas along the coast.	About 50% of the coast is National Park.	Data not available – tenure of coastal land in Queensland is varied and complex	Aboriginal people own and manage 78% of the Northern Territory coastline through inalienable Aboriginal freehold granted under the *Aboriginal Land Rights (Northern Territory) Act 1976*, with a further 12% subject to outstanding land claims, conferring a high degree of control over access and use. Over 40% of NT's coast is currently managed as Indigenous Protected Areas. The majority of the remainder of the NT's coast and intertidal areas are, or are likely to be, subject to non-exclusive native title determinations, which provide for access and use rights in coexistence with other interests. Oher coastal tenures include Crown land and pastoral lease.
ACQUISITION OF COASTAL RESERVES	Land is ceded free of cost to the State of WA as a requirement of subdivision and development approvals.	Under the Coast Protection Act and its Board, the Governor may proclaim any part of the coast as a coastal protection district. This zone defines the area in which the Board can operate. For the purposes of the Act, the coast includes all state waters. In limited cases a 50m public reserve, measured from the toe of the primary dune or the top edge of an escarpment, may be required as part of a development process. This is in addition to any erosion hazard buffer.	Reserves created through subdivision are surrendered to the Crown under section 8 of the *Crown Lands Act 1976*. LGs can refuse subdivision that includes littoral or riparian reserve up to 30m, under section 85 of the *Local Government (Building and Miscellaneous Provisions) Act 1993*.	There is no process for acquiring the 4% of private land, other than compulsory acquisition or applying a public land overlay. The latter requires owners' consent and the permissible land uses are very restricted.	The Coastal Lands Protection Scheme is used to bring significant coastal lands into public ownership and provides for their long term management and care. The Department of Planning, Industry and Environment administers the Scheme, which receives an annual budget allocation of approx. $3 million for strategic acquisitions.	The *Coastal Protection and Management Act 1995* (Coastal Act) gives the State land surrender powers to place in State ownership land vulnerable to coastal erosion and unsuitable for development, and to dedicate such lands as Reserves for Coastal Management. The Act enables the following land to be transferred into State ownership where subdivision of the land is proposed (in certain circumstances) in a declared erosion prone area (i.e. vulnerable to coastal erosion and tidal inundation in a coastal management district	Nil
HOW IS THE EXTENT OF COASTAL ZONE DEFINED	SPP 2.6 - State Coastal Planning Policy requires the provision of coastal foreshore reserves according to the merits and circumstances of a particular proposal or situation.	The Planning and Design code under the *Planning, Development and Infrastructure Act 2016* includes an overlay/s that defines coastal areas for the purposes of the act.	The State Coastal Policy guides sustainable use and development of coastal areas. The State Policy defines the coastal zone as State waters and all land to a distance of one kilometre inland from the high-water mark. Planning schemes and the Tasmanian Planning Scheme (including the Local Provisions Schedules) are required to be consistent with the State Coastal Policy.	The *Marine and Coastal Act 2018* provides definitions for: the marine and coastal environment; sea; Victorian coastal waters; marine environment; marine and coastal Crown land.	Coastal zone is defined in section 5 of the *Coastal Management Act 2016* to include the area of land comprised of the following coastal management areas: • coastal wetlands and littoral rainforest area; • coastal vulnerability area; • coastal environment area; and • coastal use area. Each of these four areas are defined by reference to maps contained in the State Environmental Planning Policy (Coastal Management) 2018. Councils are required to map the vulnerability area as part of their coastal management programs. The State Government or local councils can propose amendments to the coastal zone maps.	Erosion prone areas and the coastal management district are defined by Dept. of Environment and Science (DES) pursuant to *Coastal Protection and Management Act 1995*, and may be refined by Local Government localise study. DES is guided by its Coastal Hazard Technical Guide. Erosion prone areas are generally unsuitable for development. Coastal Management Districts are coastal areas considered in need of protection or management, declared under the Coastal Act. State Planning Policy (July 2017) requires local government planning schemes to regulate development in these areas in line with the SPP.	The *Coastal Waters (NT Powers) Act 1980* defines the extent of terrestrial sea and coastal waters (3 nautical miles from the coast). The terrestrial boundary is defined in the NT Coastal and Marine Management Strategy as the extent of marine influence, including coastal processes such as storm surge. Land zoned under the NT Planning Scheme includes a mapped overlay of 'land subject to storm surge'.

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
STRATEGY	WA Coastal Zone Strategy 2017	• SA Planning Strategy (includes climate change adaptation) • Coast Protection Board Strategic Plan (2012-2017) • Coast Protection Board Policy Document (2016) • Climate Change Strategy for South Australia • Climate Change Action Plan 2021-25 • Blue Carbon Strategy for South Australia (2019)	• There are 3 regional land use strategies (North-West, Northern and Southern) approved by the Minister for Planning under the *Land Use Planning and Approvals Act 1993* which are required to be consistent with the State Coastal Policy	• The first Marine and Coastal Strategy will be prepared by 2022. • Victorian Floodplain Management Strategy 2016 and four coastal regional floodplain management strategies • Victorian Waterway Management Strategy 2013 and five coastal regional catchment strategies • Climate Change Strategy 2021 sets out a roadmap to net-zero emissions and a climate resilient Victoria by 2050.	Our Future on the Coast: An Overview of Coastal Management in NSW, 2018. Local councils prepare coastal management programs to set the long term strategy for their part of the coastline – Coastal Management Act 2016 s 12. NSW Marine Estate Management Strategy 2018.	Coastal hazard adaptation strategies funded by the QCoast2100 program Queensland Climate Adaptation Strategy 2017-2030	NT Coastal and Marine Management Strategy 2019-2029. Northern Territory Climate Change Response: Towards 2050.
POLICY	• SPP 1 – State Planning Framework • SPP2 – Environment and Natural Resources Policy • SPP 2.6 – State Coastal Planning Policy 2013 • Coastal Protection Policy 2005 (DoT)	• State Planning Policies under the *Planning, Development and Infrastructure Act 2016* • Coast Protection Board Policy Document (2016) • Coastline: Coastal erosion, flooding and sea level rise standards and protection policy (1992)	State Coastal Policy 1996 The Tasmanian Government is preparing legislation for the introduction of a suite of Tasmanian Planning Policies (TPPs) which will inform the planning system more directly than State Policies but must be consistent with those.	• The Marine and Coastal Policy 2020 guides planning and management of coastal and marine areas. The Policy includes a Marine Spatial Planning Framework. • Relevant policies are also given effect through the statewide Victoria Planning Provisions. • Municipal Strategic Statements in local planning schemes provide the key strategic planning, land use and development objectives for each municipality with related strategies and actions. It provides the strategic basis for decision-making by the responsible authority and may include direction for the planning and coordination of foreshore and coastal areas.	• State Environmental Planning Policy (Coastal Management) 2018	State Planning Policy (July 2017) includes protecting and enhancing the coastal environment while supporting coastal-dependent development, compatible urban form and safe public access along the coast.	No specific planning policy.
GUIDELINES	• SPP 2.6 - State Coastal Planning Guidelines 2013 • Coastal Hazard Risk Management and Adaptation Planning Guidelines 2019 • Coastal Planning & Management Manual 2003 • Marine Community Monitoring Manual • Draft Planned or Managed Retreat Guidelines, August 2017	• Coast Protection Board Position Paper (May 2015) • Coastal Planning Information Package (Nov 2013)	• Tasmania's Climate Change Action Plan • Tasmanian Coastal Adaptation Pathways • Communities and Coastal Hazards Project, 2015-16 • Coastal Hazards Package (2016) • Coastal Risk Management Plan (2009) • Coastal Risk Management Guidelines s.8A - application of the State Planning Provisions in Local Provisions Schedules issued by the Tasmanian Planning Commission. • Tasmanian Coastal Works Manual (2010) - includes provisions for climate change)	• Guidelines for the Preparation of Coastal Management Plans (2017) (currently under revision) • Siting and Design Guidelines for Structures on the Victorian Coast • Victorian Coastal Hazard Guide (2012) • Guidelines for Coastal Catchment Management Authorities (2012) • Guidelines for Coastal Catchment Management Authorities: Assessing Development in relation to Sea Level Rise (June 2012). • Planning Practice Note No. 53: Managing Coastal Hazards and the Coastal Impacts of Climate Change (2008) • The Coastal Spaces Landscape Assessment Study (2006) • Guidelines for developing a long-term local coastal hazard adaptation plans (to 2100+) (in development) • Marine Spatial Planning Guidelines (in development)	• NSW Coastal Management Manual (2018) • Coastal Management Toolkit • NSW Coastal Design Guidelines (2003) - currently being updated	• SPP guidelines • QCoast2100 program minimum standards and guideline for developing a Coastal Hazard Adaptation Strategy • Land Surrender for Coastal Management • Various other guidelines of DES	• Planning and building rules for land affected by natural hazards.

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
COASTAL MANAGEMENT PLANS (CMP) REQUIRED BY LEGISLATION NB. THERE ARE MANY LOCAL/SMALL SCALE CMPS ETC.	There is no coastal protection legislation to require CMPs.	From the establishment of the Coast Protection Board in 1972 to the introduction of the *Development Act 1993*, the Board progressively undertook the development of Coast Protection District management plans, working from the Victorian Border westwards. The direction established by the *Development Act 1993* was that of a "one-stop shop" for development control, which includes changes of land use. In accord with this priority, the Board redirected its resources into developing its policy framework and applying it to the planning system, using the principles and processes described above. A consequence of this change of direction was that management plans were not developed for all Coast Protection Districts. However, the Board's policies are reflected in *Planning, Development and Infrastructure Act 2016*'s Planning and Design Code, and in NRM Boards' Coastal Conservation Assessments and Coastal Action Plans (recently transitioned to Landscape SA Boards under the *Landscape South Australia Act 2019*).	There is no coastal protection legislation to require CMPs.	The *Marine and Coastal Act 2018* enables the preparation of coastal and marine management plans. These plans may be prepared by one or more Crown land managers on matters relating to and affecting marine and coastal management. The purpose of these plans is to provide direction for the future local management of marine and coastal Crown land. In carrying out a function involving the management of coastal Crown land, a Minister, public authority, committee of management of the land or municipal council must take all reasonable steps to give effect to an approved Management plan applying to the land. The *Marine and Coastal Act 2018* also enables the preparation of: • Regional and Strategic Partnership products – to address regional scale issue(s) and facilitate partnerships between multiple agencies • The Port Phillip Bay Environmental Management Plan whose main objective is to promote the objectives of any State environment protection policy applying to that area (ref SEPP (Waters)) • Environmental Management Plans for other areas where it's identified that a plan is required to improve water quality, protect beneficial uses and to address threats.	The *Coastal Management Act 2016* s 13 states that a local council may, and must, if directed to do so by the Minister, prepare a coastal management program. The coastal management program must be prepared in accordance with the coastal management manual. Coastal management plans must identify: • coastal management issues • actions required to address those issues • how and when those actions will be implemented • the costs of the actions • a coastal zone emergency action sub-plan for land within the coastal vulnerability area.	Coastal Protection and Management Act requires Minister to prepare a coastal plan. Consequently the Coastal Management Plan 2014 has been established. This plan is applied to guide management planning, activities and works that are not assessable development under the *Planning Act 2016*.	There is no coastal protection legislation to require Coastal Management Plans.
MINISTERS – COASTAL AND PRIMARY LEGISLATION	• Minister for Transport, Planning and Lands • Minister for Environment	• Minister for Environment and Water • Minister for Planning	• Minister for Planning • Minister for Local Government • Minister for Environment • Minister for Parks	• Minister for Energy, Environment and Climate Change • Minister for Water • Minister for Planning • Minister for Local Government • Minister's responsible for Applicable Acts referenced in the *Marine and Coastal Act 2018*	• Minister for Local Government (*Coastal Management Act 2016*) • Minister for the Environment and Minister for Agriculture and Western NSW (*Marine Estate Management Act 2014*) • Minister for *Planning and Public Spaces (Environmental Planning and Assessment Act 1979* and Coastal Management SEPP)	• Minister for State Development, Manufacturing, Infrastructure and Planning • Minister for Environment and the Great Barrier Reef, Minister for Science and Minister for the Arts	• Minister for Infrastructure, Planning and Logistics • Minister for Environment • Minister for Climate Change
STATUTORY BODIES	Coastal Planning and Coordination Council (this is now inactive)	• Coast Protection Board • 8 regional Landscape Boards and the metropolitan Green Adelaide Board under the *Landscape South Australia Act 2019*).	Nil	• -Victorian Marine and Coastal Council – provides independent advice on marine and coastal issues to the Minister for Energy, Environment and Climate Change • -Committees of Management (delegated marine and coastal Crown land managers)	NSW Coastal Council	Nil	Nil
INTERAGENCY GROUPS	Coastal Management Advisory Group	Nil	Nil ongoing	Nil ongoing	Nil	Nil	Nil

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
STATE AGENCIES	• Department of Planning, Lands and Heritage (DPLH) • Department of Transport (DoT) • Environmental Protection Authority • Department of Water and Environmental Regulation	• Department for Environment and Water(DEW) • Attorney General's Department, Planning and Land Use Services	• Department of Justice (Planning Policy Unit) • Dept. of Premier and Cabinet (DPAC) (Tasmanian Climate Change Office; Office of Security and Emergency Management) • Tasmanian Planning Commission • Dept. of Primary Industries, Parks, Water and Environment	• Department of Environment, Land, Water and Planning (DELWP) • Department of Economic Development, Jobs, Transport and Resources • Department of Transport (DoT) • Environment Protection Authority • Parks Victoria • Great Ocean Road Coast and Parks Authority	• Department of Planning, Industry and Environment (DPIE) • Department of Regional NSW (marine estate, jointly with DPIE)	• Department of Environment and Science (DES) • Department of Science, Information Technology and Innovation (DSITI) • Department of State Development, Manufacturing, Infrastructure, and Planning	• Department of Infrastructure, Planning and Logistics • Department of Environment, Parks and Water Security • Office of Climate Change
STATE AGENCY RESOURCES	5 FTE @ DPLH 5 FTE @ DoT	16 FTE @ DEWNR in the Coastal Management Branch including Coastal Engineers and Scientific Officers, Planners, Surveyors and Administration staff. 6 FTE project team delivering sand and infrastructure to maintain Adelaide's beaches under the $48.4 million Securing the future of our coastline project.	1 FTE @ DPAC (other agencies unknown)	About 25 FTE across various divisions of DELWP; no details of other agencies.	About 25 FTE @ DPIE	15-20 FTE @ DES across various divisions 3-5 FTE @ DSDITI	FTEs cannot be specifically attributed to coastal hazard management.
GRANTS OR FUNDING	• WAPC Coastwest Grants provides $325k pa for several grants $5-50k. • WAPC Coastal Management Plan Assistance Program provides about $275k pa for several grants up to $125k. Up to 50% WAPC: 50% LG/coast manager. • Department of Transport's Coastal Adaptation and Protection grants provides $1m.	Coast Protection Fund – about $350k pa (2015)(Up to 80% from Board: 20% from LG) From 2019-2023, addition $1 million per year of funding is available for a regional grants program. (The Adelaide Metropolitan Beaches are managed separately and subject to different funding arrangements, see above).	Tasmanian Coastal Adaptation Pathways Project (TCAP) - 3 rounds of TCAP funding completed 2011-2015.	Total of over $81M on marine and coastal management funds and grants, from 2017-2018 to 2021-2022.	Funding of $83.6m (2016-17 to 2020-12021) under Coastal and Estuary Grants Program. Grant funding to councils, based on beneficiary pays, and results of cost benefit analysis for large projects. Coastal Lands Protection Scheme brings land into public ownership – annual budget of approx. $3m.	Qld Local Government Coastal Hazard Adaptation Program (QCoast2100) - $12m over 3 years (from June 2016) Community Sustainability Action grants also provide $12m over 3 years for projects addressing climate change and conserving natural and built heritage environment.	No grants specifically directed toward coastal hazard management. Various grants programs (e.g. NT Environment Grants; Aboriginal Ranger Grants Program; Darwin City Community Grants Program) may provide funding to specific landowner or community-based action on coastal management.
DELIVERY OF ADAPTATION OPTIONS	Local government or management bodies and community groups.	Local government	Local government	State government, local government, and delegated Crown land managers (Committees of Management that include Parks Victoria, Local Government, and appointed skills-based committees)	Predominantly Local government, however larger projects may be developed and implemented by NSW Government.	Local government	NT Government Local government
PRIMARY WEBSITE(S)	• www.dplh.wa.gov.au/coastal-planning • www.transport.wa.gov.au/imarine/coastal-erosion-and-stability.asp	• www.environment.sa.gov.au/topics/coasts https://www.environment.sa.gov.au/topics/coasts/coast-protection-board	• www.dpac.tas.gov.au/divisions/climatechange/climate_change_in_tasmania/impacts_of_climate_change/coastal_impacts • www.dpac.tas.gov.au/divisions/osem/coastal_hazards_in_tasmania • https://planningreform.tas.gov.au/ • www.dpac.tas.gov.au/__data/assets/pdf_file/0006/91392/State_Coastal_Policy_1996.pdf	• www.coastsandmarine.vic.gov.au • www.climatechange.vic.gov.au • www.planning.vic.gov.au • www.water.vic.gov.au • https://transport.vic.gov.au • www.marineandcoastalcouncil.vic.gov.au	• www.environment.nsw.gov.au/topics/water/coasts/coastal-management • www.planning.nsw.gov.au/Policy-and-Legislation/Coastal-Reforms/Current-NSW-Coastal-Framework	• www.ehp.qld.gov.au/coastal/ • www.ehp.qld.gov.au/coastalplan/coastalhazards.html • www.qcoast2100.com.au/	• https://depws.nt.gov.au/ • https://nt.gov.au/property/land-planning-and-development/planning-professionals-and-applicants/planning-and-building-rules-for-land-affected-by-natural-hazards • https://depws.nt.gov.au/programs-and-strategies/climate-change-response-towards-2050
COAST ADAPT	https://coastadapt.com.au/planning-approaches-western-australia	https://coastadapt.com.au/planning-approaches-south-australia; www.environment.sa.gov.au/our-places/coasts/Resources (includes guide to sea level rise)	https://coastadapt.com.au/planning-approaches-tasmania	https://coastadapt.com.au/planningapproaches-victoria	https://coastadapt.com.au/planning-approaches-new-south-wales	https://coastadapt.com.au/planning-approaches-queensland	https://coastadapt.com.au/planning-approaches-northern-territory

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
OTHER	Nil	Nil	Nil	https://mapshare.vic.gov.au/coastkit/naturekit.biodiversity.vic.gov.au www.floodzoom.vic.gov.au	Wave and water level data collection program undertaken by Manly Hydraulics Laboratory (www.mhl.nsw.gov.au) for DPIE. Current Seabed mapping program to underpin sediment compartment approach to erosion assessment funded through Coastal Reform funding package.	Nil	Nil

COMMONWEALTH Coastal Management Legislation and Structural Arrangements (Provided March 2020)

In general Commonwealth responsibilities are restricted to Commonwealth marine areas. The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters. The Commonwealth marine area stretches from 3 to 200 nautical miles from the coast and is a matter of national environmental significance under the EPBC Act (see below). Marine protected areas are marine areas which are recognised to have high conservation value. Anything closer than 3 nautical miles (coastal waters) is in general the responsibility of states and territories and local governments.

Coastal waters (3 nautical mile limit)

Coastal Waters is a belt of water between the limits of the Australian States and the Northern Territory. Jurisdiction over the water column and the seabed is vested in the adjacent State or Territory as if the area formed part of that State or Territory. This, and other arrangements for the management of offshore resources such as fisheries and petroleum, are defined by the Offshore Constitutional Settlement (OCS). The principal legislation implementing the OCS is:

- *Coastal Water (State Powers) Act 1980*
- *Coastal Waters (State Title) Act 1980*
- *Coastal Waters (Northern Territory Powers) Act 1980*

Coastal Waters (Northern Territory Title) Act 1980.

This legislation is administered by the Attorney-General.

In addition, the following are examples of Commonwealth legislation administered by the Commonwealth Department of Agriculture, Water and the Environment that apply to specific actions that may have impacts on coastal waters and habitats:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* – applies where there is coastal development that may impact on matters of national environmental significance (such as Ramsar wetlands, threatened species and ecological communities, Commonwealth land – including Defence lands etc)
- *Environment Protection (Sea Dumping) Act 1980* – protects water surrounding Australia's coastlines from wastes and pollution dumped at sea. Regulates the loading and dumping of waste at sea and ensure that Australia meets it's obligations under the London Protocol to prevent marine pollution by dumping of wastes and other matters. Permits are required for all ocean disposal activities which include: dredging operations; creation of artificial reefs; dumping of vessels; platforms or other man-made structures; burials at sea.
- *Great Barrier Reef Marine Park Act 1975*

Table 2: Existing Coastal Hazard Risk Information

(last updated March 2021)

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
What scale of erosion assessment has been completed?	Statewide assessment completed (2019). 27 of 45 coastal local governments are currently completing or have completed through a CHRMAP.	No statewide assessment completed. Local assessments have been completed for 38 coastal settlements across 17 local governments.	Statewide assessment completed (2016). Update commenced May 2020.	Second pass Statewide investigation completed 2017. Third pass assessments completed at 4 locations (2015-2015), with a fifth near completion, and another two initiated (2021). Third pass detailed sediment budget and coastal erosion assessments for priority areas of Victoria (Victorian Coastal Monitoring Program). Erosion data for second pass state-wide assessment and third pass assessments available on Coastkit and by request for all input and output data sets.	First pass – Proximity analysis Second pass – Region-scale modelling Third pass – Local government hazard lines Completed in 2017.	Statewide assessment completed.	No statewide assessment completed.
What scale of inundation assessment has been completed?	No statewide assessment completed. 24 of 45 coastal local governments are currently completing or have completed through a CHRMAP.	No statewide assessment completed. Flood mapping has been undertaken for 57% of the coast.	Statewide assessment completed (2016). The Tasmanian Flood Map project is currently underway.	Victorian projected sea level rise and storm surge data sets were modelled in 2012 based on 2009, 2040, 2070 and 2010 climate change scenarios (= land subject to coastal inundation due to projected sea level rise and storm surge) This data has been used to underpin all hazard assessment projects described for 'erosion assessments' above. Sea level and storm surge data for second pass state-wide assessment and third pass assessments available on Coastkit and by request.	Statewide estuarine inundation assessment completed (2018). Second pass estuarine inundation assessment. Open coast inundation not assessed as dunes provide some level of protection. Completed in 2018.	Statewide assessment completed.	Territory assessment completed. Storm surge inundation maps completed for areas in Greater Darwin, and for communities in the Gulf and Top End regions, based on the projected mean sea level by year 2100.
What is the scale and impact of coastal hazard risk?	Erosion assessment identified 55 hotspot sites in WA (approx. 51km of coastline). **Erosion impacts:** • 136 assets (0-5 years) • 201 assets (5-25 years) • 252 assets (25 year+) In addition, 31 watchlist sites were identified for future investigation. **Inundation impacts:** • National First Pass Assessment (2009): Between 18,700 and 28,900 residential buildings may be at risk from 1.1 metres of sea level rise	**Erosion impacts:** • National First Pass Assessment (2009): Approx. 7,000 residential buildings located within 110m of 'soft' erodible shorelines of which approx. 1,600 are within 55m of 'soft' coast. **Inundation impacts:** • National First Pass Assessment (2009): Between 25,200 and 43,000 residential buildings may be at risk from 1.1 metres of sea level rise.	**Erosion impacts:** • 734 houses potentially vulnerable (2010) • 2,068 houses potentially vulnerable by 2050 • 3,788 houses potentially vulnerable by 2100 (5.7%)*. **Inundation impacts:** • 85 houses potentially vulnerable in 2010 from the 2010 mean high tide • 1,373 houses potentially vulnerable by 2050 from a 1% AEP storm surge event or a 0.8m sea level rise from the 2010 mean high tide. • 3,152 houses potentially vulnerable by 2100 (1.2%)*. ** Percent of existing residential*	2017 statewide investigation identified the extent of high value coastal assets that may be impacted by erosion or inundation. For residential coastal property: • 6,118 ha (8.7%)* with high and very high coastal erosion vulnerability ratings • 2,461 ha (3.5%)* impacted by 0.2m sea level rise at 2040 • 5,440 ha (7.7%)* impacted by 0.82m sea level rise at 2100 • 8,068 ha (11.5%)* impacted by storm surge at 2040 • 13,410 ha (19.0%)* impacted by storm surge at 2100 ** Indicates the total of residential coastal land impacted. Note: total residential property along Victoria's coastline was 70,360 ha at the time of the study.*	**Erosion impacts:** First pass: • 54km of sandy coastline within 55m of existing properties • 93km of sandy coastline within 110m of existing properties • 158km of sandy coastline within 220m of existing properties Second pass: • 1,200 lots (2,300 total addresses) vulnerable at present day • 3,100 lots (5,200 total addresses) vulnerable at 2050 • 4,800 lots (8,200 total addresses) vulnerable by 2100. Third pass: • >1,000 lots (2,000 total addresses) vulnerable at present day • 2000 lots (3,700 total addresses) vulnerable by 2050 • 3,500 lots (6,800 total addresses) vulnerable by 2100. **Inundation impacts:** • 23,653 properties vulnerable (0.5m SLR) • 50,744 properties vulnerable (1m SLR) • 74,379 properties vulnerable (1.5m SLR).	31 detailed Coastal Hazard Adaptation Strategies by local government areas underway which will reassess coastal hazard areas, assets at risk and mitigation options and compile an adaptation strategy. Compilation of assets of risk for the whole State will be undertaken once all local governments provide their reports (expected by mid-2021). **Erosion impacts:** • National First Pass Assessment (2009): Approx. 15,200 residential buildings located within 110m of 'soft' erodible shorelines of which approx. 5,400 are within 55m of 'soft' coast. **Inundation impacts:** • National First Pass Assessment (2009): Between 35,900 and 56,900 residential buildings may be at risk from 1.1 metres of sea level rise.	**Erosion impacts:** • National First Pass Assessment (2009): Up to 190 residential buildings located within 110m of 'soft' erodible shoreline. **Inundation impacts:** • National First Pass Assessment (2009): Up to 180 residential buildings may be at risk from 1.1 metres of sea level rise.
Assets at risk categorised?	9 asset classes identified. (private, leasehold, road/rail, services, recreation, boating, SLSC/rescue, sand beach access, sand boat launching).	Private, services, visitation, public finances, storm protection.	Residential structures only.	Three broad, overlapping asset types: Economic, Social/Cultural, Environmental (natural assets including inherent elements of the coast) divided into: • 9 asset classes (e.g. Utility) • 27 asset sub-classes (e.g. Electricity) • 125 asset categories (e.g. Power plant)	Addresses - primary (houses, unit blocks) and secondary (units) include proportion of lot, road type (length), rail type (length), airports (length), power lines (length) National Parks (area), reserves (area).	Categorised as the land zoning/ use (road, residential agriculture) and area and lot number. Assets include conventional built assets as well as environmental, rural and cultural assets.	Not categorised.
Adaptation responses or actions determined?	High level responses for erosion hotspots (Avoid, Retreat, Accommodate, Protect). Individual CHRMAPs provide more detailed adaptation responses / actions.	Regional level adaptation responses to climate change.	Statewide planning and building controls implemented.	Specific responses not identified at State level. Statewide policy platform (Marine and Coastal Policy 2020) supports pathways approach to planning, and considering adaptation options in hierarchy order (non-intervention, avoid, nature -based methods, accommodate, retreat and protect). Statewide planning controls implemented for sea level rise.	Not identified at State level. Local government coastal management programs provide adaptation actions.	Not identified at a State level. Coastal hazard adaptation measures for both present day and future (2100) will be delivered by the QCoast2100 program in 2021 for local government. Detailed shoreline erosion management plans specific to hotspot areas have been developed in a limited number of cases, but further work will be needed for coastal areas under imminent threat.	Climate change adaptation strategies at Territory and local (Darwin City Council) levels.

	WESTERN AUSTRALIA	SOUTH AUSTRALIA	TASMANIA	VICTORIA	NEW SOUTH WALES	QUEENSLAND	NORTHERN TERRITORY
Cost of responses or actions estimated?	Erosion Hotspot Report identified an overall cost of estimate of $9 - 22 million per year (0-5-year timeframe).	Assessment of regional adaptation alternatives and costs is highly variable, depending on immediacy of issues and community sentiment. Regional erosion management: • Council-led projects (including grant assisted) • Total cost of 2019-20 projects = $1.7million • Conservatively extrapolated over the next 10 years = $17 million. Adelaide's managed beaches: • Current management costs = $6 million p.a • Current infrastructure delivery = $48.4 million (2019-2023) • Additional future management costs = $3 million p.a (from 2023) • 10-year total (to 2030) = $132 million. Total 10-year erosion cost estimate = $149 million.	Not calculated at State level.	Not calculated at State level.	Not calculated at State level.	Not calculated at State level.	Not calculated.
Value of assets at risk estimated?	Not calculated at State level. Completed by some local governments through their CHRMAP and by some regional areas (e.g. Peron Naturaliste Partnership, Cockburn Sound Coastal Alliance). National First Pass Assessment (2009): $4.9 – $7.7 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m. If this analysis included storm tide it is likely more properties would be at risk.	Unknown. National First Pass Assessment (2009): $4.4 – $7.4 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m. If this analysis included storm tide it is likely more properties would be at risk.	$1.5 – 2 billion of residential structures exposed to erosion (in 2100 at 2013 valuations). $1.2 billion of residential structures exposed to inundation (in 2100 at 2013 valuations). National First Pass Assessment (2009): $2.4 – $3.3 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m.	Estimate of $6.5-$11.7 billion worth of built assets at risk from inundation based on a 0.8m sea level rise by 2100. A new study of the economic costs of projected climate change damages compared to adaptation investment is currently being completed. National First Pass Assessment (2009): $6.5 – $10.3 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m.	National First Pass Assessment (2009): $12.4 – $18.7 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m. This is likely to be underestimated as it did not include a wave setup component. Using the more recent 2nd pass erosion and inundation assessments, NSW Treasury calculates by 2061, total direct annual economic costs associated with erosion and inundation at between $850 million and $1.3 billion per annum (in 2019-20 dollars). The bulk of this cost relates to the loss of land through inundation and coastal recession.	Not determined yet, but can be calculated based on asset valuations. National First Pass Assessment (2009): $10.5 – $16 billion of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m. If this analysis included storm tide it is likely more properties would be at risk.	National First Pass Assessment (2009): $23.5 – $57.7 million of residential buildings (2008 valuations) at risk of inundation from a sea level rise of 1.1m. If this analysis included storm tide it is likely more properties would be at risk.

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What other coastal hazard risk information has been collected?	CHRMAPs are progressively being completed by local governments. LiDAR survey and bathymetric mapping covering 700km of coast between Horrocks (north of Geraldton) to Cape Naturaliste (Busselton).	Regional adaptation plans (under the *Climate Change and Greenhouse Emissions Reduction Act 2007*) have been completed. Adelaide beach management strategy focussing on beach replenishment.	The 2016 Tasmanian State Natural Disaster Risk Assessment included an assessment of the state level risks associated with coastal inundation. As part of the Tasmanian Coastal Adaption Pathways Project (2011-2015) and Communities and Coastal Hazards Project (2015-16), localised coastal hazard adaptation plans for 14 coastal hazards hot-spots were developed. A number of Tasmanian Municipal Councils, including Clarence City Council and Kingborough Council have undertaken detailed regional and local assessments of coastal inundation and erosion risks, and developed risk management plans.	Victorian Coastal Monitoring Program (2017 to 2021) - priority open coast and embayment coastal compartments (sediment dynamics, geomorphology, wave climate). Local coastal hazard assessments have collected location specific information. Conceptual models have been developed at the whole-of-bay scale for Port Phillip Bay and for three local regions: the Werribee region, the Mentone to Frankston sand belt, and the Nepean Peninsular, to qualitatively assess the impacts of SLR, and other changes in climate over the Port Phillip Bay region.	Developed tools to calculate exposure based on hazard extent and the NSW geocoded urban and rural address system. Developed a statewide wave model (100m resolution) and piloted a method to undertake a state scale first pass open coast inundation assessment which compares predicted wave runup height with dune height.	The QCoast2100 program has $13M to fund development of coastal hazard adaptation strategies by local governments, covering covers coastal erosion, storm tide inundation and climate change impacts to 2100. To date the program has funded 31 coastal local governments which covers all at risk major urban centres and over 90% of at risk population and assets.	Sea-level rises have been projected for all local government areas (CSIRO 2020). Research on ecological and cultural impacts of sea level rise and saltwater intrusion, particularly for floodplains in Kakadu National Park.
What coastal hazard risk information is still needed?	• 9 Local government / coastal manager CHRMAPs needed to cover remaining 12 erosion hotspots that don't have one. • Statewide inundation hotspots assessment. • Hazard mapping and geotechnical assessments for high priority sites.	• Complete baseline coastal LiDAR along the SA coast. • Follow-up LiDAR to track future coastal evolution. • Detailed coastal protection and adaptation plans for numerous regional settlements either currently subject to coastal hazards, or expected to be with continuing climate change.	The Tasmanian Flood Mapping Project will deliver statewide strategic flood maps for 0.5%, 1%, and 2% AEP flood events under current and projected 2100 climatic conditions. These maps will enhance existing coastal inundation hazard mapping by providing additional information on the coincident storm surge and riverine flooding inundation hazard in estuarine areas. Comprehensive inshore bathymetry, and a network of wind and wave monitoring to assist with near shore wave setup and runup modelling as inputs into more detailed storm surge inundation modelling. Existing statewide coastal hazards mapping may need to be revised following the release of the IPCC Sixth Assessment Report (due to be released in 2022).	• Maintain and conduct regular shoreline data collection through Victorian Coastal Monitoring Program. • Baseline terrestrial and marine LiDAR and bathymetry survey statewide, with program for future updates. • Consistent methodology/ database for statewide mapping of coastal hazard areas to inform planning • Improved understanding of hazards beyond erosion and inundation, e.g. groundwater impacts, land subsidence, cliff/ shoreline stability.	Currently working on the collection, classification and delivery of high-resolution seabed data (marine LiDAR, multibeam mapping and seabed sampling) to enable improved coastal erosion hazard assessments based on sediment compartment and sediment budgeting concepts. Considering refining the coastal erosion exposure assessment with the recently collected marine LiDAR and multibeam mapping data as well as improved data improved data on building location (geoscape) and to examine impacts on cultural heritage. To complete the open coast inundation assessment a re-run is needed of the nearshore wave transform with the recently collected marine LiDAR and multibeam, and then undertake the statewide assessment.	Some local governments are yet to provide information into QCoast2100. Detailed bathymetry of the coast especially nearshore for erosion calculation and storm tide modelling, coastal process studies, sand resource identification, works design etc. Economic impact on communities of coastal hazard impacts (versus simple asset loss) which would assist in decision making for coastal management.	Development of climate change risk adaptation and response frameworks is a component of the Three-Year Action Plan under the NT's *Delivering the Climate Change Response: Towards 2050* strategy published in 2020. Continued work on modelling saltwater intrusion risk in coastal floodplains and developing mitigation / adaptation responses.
What has prevented the information identified above from being collected?	Funding (e.g. LiDAR coverage not achieved statewide).	Prioritisation of resource allocation has focussed on current risks.	Business cases to develop a comprehensive inshore bathymetry data set and establish a coastal wind and wave monitoring network have not been prepared. As a result, an assessment of the costs and benefits of the proposals is not available.	Previous funding was directed to completing local coastal hazard assessment of priority areas. As part of the Marine and Coastal Reform Program, a state-wide approach with additional funding commenced in 2017. This is building an information base about coastal processes to support hazard assessment planning, but further funding, work and time are needed.	The seabed mapping work was prioritised in the recent coastal reform process and is funded to 2021. Progressing the refinement of the coastal erosion exposure assessment and the open coast inundation assessment is constrained by current resourcing. Previous assessments were part funded through the Natural Disasters Resilience Program which no longer has a state projects stream.	Lack of funding.	Prioritisation of limited resources.

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How is coastal hazard risk management and adaptation funded? Is this sufficient?	State grants programs: CHRMAPs funded through the Coastal Management Plan Assistance Program ($275,000 p.a). On-ground coastal management activities and adaptation measures funded through the Coastwest program ($325 p.a) and the Coastal Adaptation and Protection grants ($1M p.a)	• Annual allocation of funding for Coast Protection Board ($550,000 p.a.). • Adelaide Beach management: $6M p.a. conducted by Department for Environment and Water (DEW). • Securing the future of our coastline project commitment 2019-2023: additional $48.4M for Adelaide beach management; • $4M for regional coastal protection grants. Conducted by DEW. • New life for our coastal environment election commitment 2018-2022: $5.2M for beach replenishment, stormwater management, R&D, offshore reef development, seagrass restoration. Administered by DEW. Development, design and delivery of protection and adaptation measures, for metropolitan (outside the managed beach system) and regional settlements, and for coastal natural systems, will require additional medium and long-term resources.	• The Tasmanian Government, with support from the Australian Government and Municipal Councils, to undertake strategic and local level risk management and adaption planning. The Tasmanian Government's Climate Action 21: Tasmania's Climate Change Action Plan 2017-2021 (Climate Action 21) includes fully funded projects to understand and manage the impacts of coastal hazards to existing settlements; • Municipal Councils, with support as required from the Tasmanian and Australian Governments, to construct mitigation infrastructure to address existing inundation and erosion hazards posing risks to public assets; • Businesses to construct mitigation infrastructure and undertake adaptation activities; • Private landowners to construct localised, small scale, mitigation infrastructure to address existing inundation and erosion hazards posing risks to private assets.	• Program funding is from several sources. The State funds state-wide coastal hazard programs and funds local/regional action in priority areas.	• The State provides financial support to councils to develop and implement coastal management programs which include management and adaptation to coastal hazards. Generally, this is provided on a 50:50 basis with funding of works based on a beneficiary pays principle. • As part of the coastal reforms, a funding package of $83.6M was announced for coastal management from 2016–17 to 2020–21. The Coastal and Estuary Grants Program is part of this package with $63.2M available to councils to implement actions from their Coastal Management Programs. • The program supports coastal and estuary planning projects and the implementation of works identified in certified coastal zone management plans or coastal management programs.	• $13.2M in funding (QCoast2100) provided by the State to deliver coastal hazard adaptation strategies for coastal local governments (41 in total). Site specific erosion investigations and management plans are funded by local government. This included $1.234M committed at the start of 2020. • At present there is no funding sources outside of local government budgets specifically for coastal management or protection works. There are general funding sources which can cover coastal protection, but these are limited and apply to a broad range of projects e.g. Resilience and Risk Reduction Funding for disaster risk reduction initiatives.	No funding programs specifically directed toward coastal hazard risk management. Specific coastal erosion management projects funded by City of Darwin and Northern Territory Government. Relevant ecological and cultural research primarily funded buy Commonwealth programs such as National Environmental Science Program.

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What aspects of coastal hazard risk management would benefit from a national collaborative or consistent approach?	• Federal Government funding to support coastal hazard risk management, to help address the growing gap in coastal management and available State and local government budgets. • Development of nationally agreed high-level vision, goals and principles for coastal planning and management. Including a consistent approach to determining baseline sea level rise values. • Development of a nationally agreed Coastal Hazards Adaptation Strategy that provides guidance on best practice approaches to the management of coastal hazards and an agreed framework for funding local action, preventative as well as reactive. • The strategy will need to consider a pathway approach to decision making and adaptation actions. It should include: non-intervention; locating new uses, developments and re-development away from areas that are or will be negatively impacted by coastal hazards; modifications to reduce exposure to, or decrease the impact of, coastal hazard risk; and protection for continued use. • Identification of a national proponent to lead development of a national strategy (as above). This could be a Commonwealth agency partnering with an intergovernmental group such as the CHWG. • Improving community and stakeholder engagement and education when developing adaptation options, including consideration of planned or managed retreat. • Sharing of information and experience on coastal hazard risk management.	• Consistency of resourcing / funding arrangements with the Federal Government. • Liaison with Infrastructure Australia. • National and state-wide climate change projections, process modelling, monitoring programs (i.e. BoM Seaframe, wave measurements).	• Research into coastal processes and the effect of climate change on coastal hazard risks, including the changing likelihood and impact of compound flooding events in estuarine areas; • Legal liability associated with undertaking coastal adaptation works; • Hazard and impact mapping of rapid and incremental change, including the use of remote sensing data. Tasmania developed data sets that were developed into national data sets as part of the Geoscience supported https://ozcoasts.org.au/ projects. Tasmania continues to leverage a lot of the data. A lot more work could be done in this space to fill a few gaps; • Sharing of information, risk management processes and decision support tools on platforms such as CoastAdapt; • Capacity and capability building for financial management, land use planning, building and construction, emergency management, and community resilience professionals; • Building and construction codes and standards.	Establishing a National Marine and Coastal Observatory, for sustained observing systems to address critical knowledge gaps, from 5 kms inland the coastline to 50 metres depth, for coastal and marine monitoring and data acquisition, including up to four total monitoring stations in Victoria for tides, waves, currents, temperature, pressure, salinity, turbidity etc. Cooperative funding agreement/ model to resource a network of monitoring sites for wave climate, tidal level and sediment budget dynamics in partnership with States through Integrated Marine Observing System (IMOS) https://imos.org.au/ Continuing to improve communication and socialisation of coastal hazard information with the wider public. Discussions and negotiations with Insurance Council of Australia about future approaches about dealing with coastal hazard/risks. Continuing the CoastAdapt resources that contribute to: • Building a national narrative about coastal hazards to support: • consistent guidance for coastal managers, users and communities; and • defining and communicating clear minimum standards and expectations about dealing with coastal hazards/risks • Improving planning and consistency of approaches to avoid future costs from hazards • Assessing costs of inaction • Developing evidence to support coastal managers and communities taking the most constructive steps early (invest now to avoid future liability / minimise the need for future disaster recovery responses) • Developing opportunities for coastal planners/ managers from different jurisdictions to learn from each other's experience • Coordinating sharing of information and experience about hazard assessment, planning and management including decision support tools.	• Incorporate a nationally consistent risk based approach to planning for sea level rise. • A national funding program (like the Natural Disasters Resilience program) to support coastal risk management would be helpful. This could include funding streams like risk assessment, planning, monitoring, education / communication and works. A key issue to be addressed from a nation perspective is the framework and means (funding) to implement the growing body of coastal adaptation requirements identified through various planning processes in a timely and prioritised path.	Jurisdictions often face coastal management issues relatively unique to their coastal morphologies, coastal hazard drivers, development history and regulatory regime. Hence national collaboration may be limited to a high-level approach.	Coastal management issues for the Northern Territory are relatively unique (or shared across far northern Australia). A national funding program (like the Natural Disasters Resilience program) to support coastal risk management would be helpful.

Table 2 References:

Western Australia

Assessment of Coastal Erosion Hotspots in Western Australia (2019)

List of Coastal Hazard Risk Management and Adaptation Plans in WA

South Australia

Adelaide beach management research, reports and policies

Regional adaptation plans

Tasmania

Mitigating Natural Hazards through Land Use Planning and Building Control – Coastal Hazards Technical Report (2016)

Coastal Hazards in Tasmania

Tasmanian State Natural Disaster Risk Assessment

Tasmanian Coastal Adaptation Pathways Project

City of Clarence – Climate change, coastal engineering and risk management

Kingsborough Council – Climate change adaptation

Flood Risk Management

Victoria

Victorian Coastal Hazard Assessment (2017)

Victorian Coastal Monitoring Program

Bellarine Peninsula and Corio Bay Local Coastal Hazard Assessment (2015)
Series of reports:

- *Inundation full report*
- *Inundation Summary Report*
- *Risk methodology report*
- *Coastal Inundation Options Report*
- *Coast Impact Solutions Tool*

Westernport Local Coastal Hazard Assessment (2014) - *Series of reports*

Gippsland Lakes / 90 Mile Beach Local Coastal Hazard Assessment (2014)
Series of reports:

- *Report 1: Summary Report*
- *Report 2: Inundation Hazards*
- *Report 3: Outer Barrier Coastal Erosion Hazards*
- *Report 4: Lakes Shoreline Erosion Hazard*
- *Report 5: Coastal Monitoring*

Future Coasts - Port Fairy Local Coastal Hazard Assessment

New South Wales

Coastal Erosion in New South Wales – Statewide Exposure Assessment (2017)

NSW Estuary Tidal Inundation Exposure Assessment (2018)

Queensland

QCoast2100 Program

Storm Tide Hazard Interpolation Study (2014)

Coastal Hazard Area Maps

Northern Territory

Storm surge mapping:
https://securent.nt.gov.au/prepare-for-an-emergency/cyclones/storm-surge

Appendix 1: Meeting of Environment Ministers Coastal Hazards Working Group Terms of Reference

Chair: Western Australian Department of Planning, Lands and Heritage

Background: Climate change is causing global sea levels to rise, and will continue to exacerbate coastal hazards such as coastal erosion and inundation. Both the value of coastal assets at risk from these coastal hazards and the costs of adaptation measures to manage these hazards are substantial. Coastal erosion threats to public and private assets are being experienced in all states. While state, territory and local governments have a role to play, national leadership and improved coordination of response is needed.

On 9 August 2019 the Council of Australian Governments referred the issue of coastal erosion to the Meeting of Environment Ministers (MEM). On 8 November 2019 the 9th MEM agreed to establish an intergovernmental working group, and Ministers acknowledged coastal erosion and inundation as a risk that requires a collaborative approach from all levels of government. On 4 December the MEM Adaptation Working Group advised that this project did not fall within its terms of reference and agreed that a distinct coastal hazards working group should be established.

Role: The role of the Coastal Hazards Working Group (CHWG) is to collate existing information on coastal erosion and inundation hazard risk management[1] to provide a national picture and explore and recommend options for a more collaborative approach to coastal erosion that will build resilience to coastal hazards.

[1] In this context, "management" is taken to mean planning, management and adaptation.

Membership: The CHWG comprises representatives from each Australian jurisdiction, the Commonwealth and Australian Local Government Association. Each jurisdiction has determined its own representation based on individual capacity and as appropriate to the needs of the CHWG.

Objectives: The objectives of the CHWG are to:

1. collate existing information on the national scale and extent of coastal erosion and inundation hazard risks, their impacts, current management effort, and estimates of future management needs;
2. explore opportunities for a collaborative approach across jurisdictions to manage coastal erosion and inundation; and
3. recommend actions that will benefit from a national collaborative approach to manage coastal hazards for consideration at the Meeting of Environment Ministers.

Reporting and duration: The CHWG was established and will operate under the terms expressed by the MEM. The CHWG is time-bound and will report back to the MEM in 2021 with a report to the Senior Officials Group (SOG) provided six weeks prior. Work of the CHWG is to be completed by July 2021.

Operations and resourcing: Meetings will be held as required subject to members' agreement and scheduling of SOG and MEM meetings. It is anticipated there will be six meetings.

Secretariat support will be provided by the Western Australian Department of Planning, Lands and Heritage.

Each jurisdiction will cover the costs of their own participation in the CHWG.

Meetings of the CHWG will utilise video/teleconferencing as much as possible, to minimise environmental impacts, meeting and travel costs. Face-to-face meetings may occur if budget and resourcing allow.

CHWG sub-groups may be established on an as-needed basis.

Decision making: The CHWG will generally make decisions by consensus. In cases where consensus is not reached each member organisation will have one vote and the position of jurisdictions will be made clear to SOG and MEM.

Version 1: Adopted 27/02/2020

Version 2: Adopted 22/07/2020