

our cairns coast

ADAPTING FOR THE FUTURE

The Cairns Regional Council (CRC) acknowledges the First Peoples within our region who are the Traditional Custodians of this country. Traditional Custodians within the Cairns region include the Djabugay; Yirriganydji; Bulawai, Gimuy Walubara Yidinji; Mandingalbay Yidinji; Gunggandji; Dulabed and Malanbara Yidinji; Wanyurr Majay; Mamu and Ngadjonjii peoples. CRC also acknowledges other First Peoples who live within this region.

We would like to acknowledge and thank those who have contributed to the development of the Our Cairns Coast Strategy. We extend our appreciation to all those who shared their thoughts and ideas on the management of our shared coastal environments. We look forward to working together to strengthen relationships, create opportunities and achieve positive outcomes for the future.



BMT

**ETHOS
URBAN**



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1 foreword

The *Our Cairns Coast: Adapting for the Future* (OCC Strategy) is an important plan for Cairns Regional Council to better understand our current and future coastal hazard risks, how these hazards might impact our coastal environments, lifestyle and communities and create a pathway for a sustainable future.

Our coastline, including our islands, coastal localities and riverfront communities, underpin the identity, lifestyle and livelihoods for many Cairns people and businesses. The coast is important to the traditions and spiritual beliefs of First Peoples. Many of the city's most important assets and services are located in our coastal strip, including the port, airport and hospitals, which are integral to the wellbeing and connectivity of our region.

Changes to our coastal environments occur naturally through wind, tides and weather events. Coastal hazards, however, are predicted to have a worsening impact on our coastline and low-lying areas because of climate change.

The coastal hazards we are planning for include:

- coastal erosion;
- storm tide inundation (cyclonic and non-cyclonic); and
- sea level rise.

The OCC Strategy sets the direction and key priority actions for Council, stakeholders and our communities to proactively plan, prepare and respond to coastal hazard risks from now until 2100.

The strategy was developed in consultation with the community, business, industry groups, government, Traditional Custodians, scientists, and others. Extensive and detailed technical mapping, analysis of risk and datasets, and consideration of the costs, benefits and values around coastal hazard adaptation options have also informed the development of the OCC Strategy.

Cairns Regional Council (CRC) is taking action to plan and adapt to these challenges to:

- reduce our future exposure to the risk of coastal hazards;
- strengthen the resilience of our communities;
- ensure a sustainable economy; and
- protect the precious and unique coastal environments upon which we rely.

The OCC strategy is our guide for deciding the types of adaptation responses needed in each locality. Council will continue to investigate and assess adaptation options to ensure the most appropriate environment, social and economic outcomes are achieved.

The OCC Strategy was funded by the Queensland Government's QCoast2100 Program. The program has assisted Queensland coastal local governments with funding and technical support to progress the preparation of plans and strategies to adapt to climate change-related coastal hazard risks from now until 2100.

The QCoast2100 Program is a state-wide initiative of the Queensland Government and Local Government Association of Queensland (LGAQ), and has assisted local governments throughout Queensland to develop

2 vision

We work together with our communities and nature to adapt to a changing climate. We are leaders in innovation in the management of coastal hazards and thrive in our coastal environments now and in the future

We will achieve this by ...



Prioritising our natural environments and their ecosystems and using nature to protect and restore



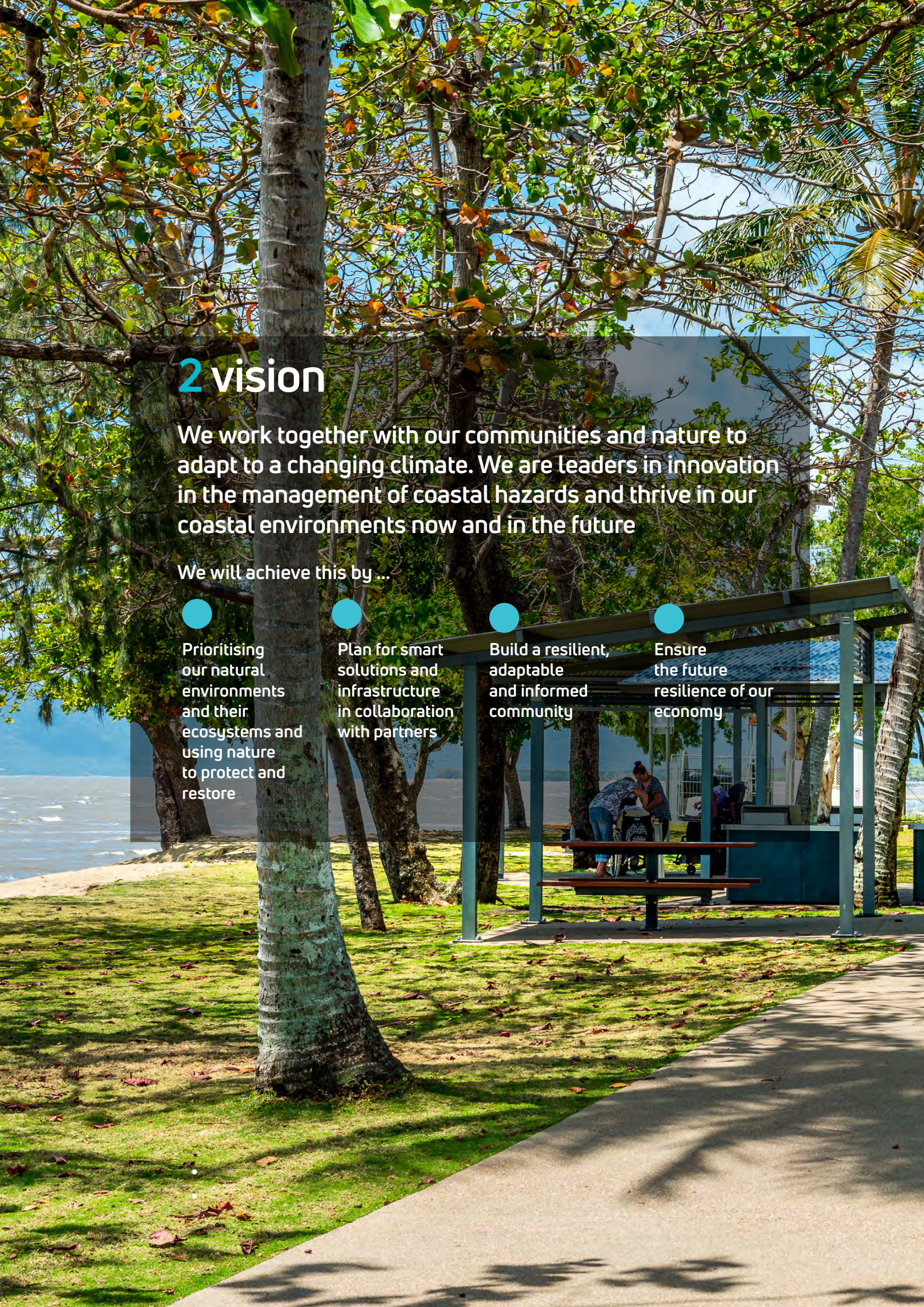
Plan for smart solutions and infrastructure in collaboration with partners



Build a resilient, adaptable and informed community



Ensure the future resilience of our economy





3 our cairns coast

Our 126km of coastline (excluding inlets and islands) largely defines the identity, lifestyle and livelihoods of our communities. From the World Heritage listed natural wonders of The Great Barrier Reef and the Wet Tropics rainforest, to our beaches, rivers, inlets, wetlands, creeks, estuaries and offshore islands, our outstanding coastal landscape is one of our most valuable natural assets. Our region is home to 9,000 species of coral, birds, fish and marine life in the Great Barrier Reef; 61 rare or threatened plant species; and 787 native wildlife species¹. Our coast also has a rich cultural heritage tied to the traditions and spiritual beliefs of our Traditional Custodians and First Peoples.

¹Cairns Regional Council website 'Statistics & Facts' ² blog.id.com.au/2020/population/population-trends/the-50-largest-cities-and-towns-in-australia-by-population-2020-update
³Cairns Regional Council - Living in Cairns booklet ⁴ Queensland Government, Wetland Info
⁵ ABS, 2016 Census QuickStats: Cairns LGA ⁶ .idcommunity Cairns Regional Council economic profile



The Cairns region encompasses 1,687km² of land on a narrow coastal strip between the Great Dividing Range and Coral Sea. It extends from the Eubenangee Swamp (near Mirriwinni) in the south, to the Macalister Range (near Ellis Beach) in the north, and takes in 18 coastal communities. The Russell, Mulgrave and Barron Rivers are the main river systems within the region. The region also includes a number of offshore islands: Fitzroy, Green, Double and Frankland Islands.

Cairns is the principal city in the Far North Queensland region and the 5th most populated city in Queensland. The areas surrounding Cairns includes coastal communities, agricultural land and areas of high ecological significance. The region is an important gateway to Cape York and its communities, the nearby Atherton Tablelands, Daintree and Wet Tropics rainforest, and the outback Savannah region beyond the Great Dividing Range.

Our population is culturally diverse and growing:

- 168,449 people live in the region¹
- 9% of the population are Aboriginal and/or Torres Strait Islander people
- 1.9% annual growth rate over the past 10 years⁶
- people from 47 nations call Cairns home³
- 1300 immigrants become Australian citizens each year⁶

Our unique coastal landscape plays a significant role in supporting our local and regional economy, both directly by attracting tourism spending, as well as indirectly, by attracting people and businesses to our region. Our response to coastal hazards today will have a direct impact on the strength of businesses, confidence in investment, lifestyle opportunities and attractiveness of visiting or living on the coast in the future. In 2019/20, the total tourism and hospitality sales (direct and In-direct) in

Cairns was \$1,737 million, the total value added (direct and In-direct) to the region's economy was \$910.7 million.

- 7624 people are employed directly in the tourism and hospitality industry⁶
- \$10.25 billion gross regional product⁶
- 84,447 local jobs⁶
- 14,074 local businesses⁶
- 3.4 million international visitor nights in Cairns in 2019 / 2020⁶

The coastline, foreshore areas and parkland, and coastal infrastructure such as boat ramps and jetties are essential for the local economy and are key tourism enablers. Significant economic activity and employment is focused in an around the Cairns CBD, which is also one of our region's most vulnerable areas. Regionally and nationally significant infrastructure in this central Cairns area includes an international air and seaport, naval infrastructure, hospital, and international convention centre.

4 our changing coast

Our coastline is dynamic and always changing; it is continuously being shaped by natural processes of wind, waves, tides, currents and changing sea levels.

Most people are aware of daily changes to our coast, beaches and dunes caused by the rise and fall of tides and actions of ocean currents, waves and wind. These natural processes can result in sand deposition, coastal erosion and changing landforms.

When these natural processes impact the way we use and experience the coast, they are referred to as coastal hazards. The coastal hazards which are the focus of this report include:

- coastal erosion
- storm tide inundation (cyclonic and non-cyclonic)
- sea level rise.

Some coastal changes can occur very quickly, while other changes occur more gradually over weeks, months or years, such as changes to the Barron River mouth or Thomatis Creek. Many Cairns residents have experienced cyclones, storms and extreme coastal hazard events in our region, such as Cyclone Yasi in 2011.

Natural coastal processes have been part of our history and will continue to be part of our future. First Peoples have deep experience and knowledge of natural coastal processes and our changing coast based on thousands of years of strong and ongoing traditional and contemporary connection with sea and country.

This strategy is forward-looking and considers coastal hazards up to 2100. The Queensland State Planning Policy 2017 requires all Councils to adopt this same timeframe and mandates use of a sea level rise factor of 0.8m by 2100, to account for climate change impacts when considering coastal hazard implications in strategic land use planning.

Cairns' First Peoples spoke about how their ancestors dealt with rising sea water in the past. Previously, many people had lived close to the shore and even been able to walk to nearby islands during low tides. As the sea level rose, this was no longer possible and camps close to the water became uninhabitable. These communities addressed this by moving camps to higher grounds (retreat). Communities used other forms of transport such as canoes to reach important island sites (accommodation and loss acceptance). These valuable lessons have been passed on through generations and provide guidance on how to cope with changing sea-levels and still maintain connection with existing values and needs.

DEFINING COASTAL HAZARDS

Coastal hazards can affect our region's natural beauty and places of ecological significance. They can impact our community's infrastructure – our roads, services, drainage, homes, businesses and utilities. The impacts and risk associated with coastal hazards are expected to increase over time with future climate change.



COASTAL EROSION - loss of land or removal of beach or dunes by waves, wind, currents, water flows or permanent inundation from sea level rise. Coastal erosion can be short-term or long-term and is influenced by changing climate conditions, sand supply and human activities.



STORM-TIDE INUNDATION - temporary inundation of land by abnormally high ocean levels caused by cyclones and severe storms.



This strategy uses the Queensland Government mandated sea level rise projection of 0.8m at 2100.



SEA LEVEL RISE - increase in sea level caused by global warming due to climate change, leading to the periodic or permanent loss of land.



LEARNING FROM EXPERIENCE

Looking back on past coastal hazard events provides the foundation for us to build on what we know works well in our region, as well as improving the way we manage the coast to strengthen our resilience and plan for future change. We know that wind and wave impacts from cyclones and storms can result in storm tide inundation and flooding of low lying coastal areas.



CYCLONES

1970

- 1971 ALTHEA
- 1976 DAWN
- 1977 KEITH & OTTO
- 1981 FRED A
- 1985 VERNON & WINIFRED
- 1990 FELICITY & IVOR
- 1991 JOY

1995

- 1996 JUSTIN
- 1998 RONA
- 2000 STEVE
- 2001 ABIGAIL
- 2005 LARRY
- 2010 OLGA
- 2011 TASHA & YASI
- 2013 OSWALD
- 2014 ITA
- 2021 NIRAN

2021

5 our strategic response to coastal hazards

The OCC Strategy provides the direction and priority actions needed to progress adaptation and proactively support the whole community in building resilience to coastal hazard risks. Responding to coastal hazards requires a shared vision and coordinated action from Council, the State Government, the Federal Government, Traditional Custodians, business owners and community members. The OCC Strategy provides the direction and priority actions needed to progress adaptation and proactively support the whole community in building resilience to coastal hazard risks, including the effects of climate change now and into the future.

purpose of the our cairns coast strategy

- Identify existing and future coastal hazard risks out to 2100 resulting from storm tide inundation, coastal erosion and sea level rise inundation, including consideration of climate change;
- Inform decision making and actions in the short, medium and long term about the location, design and management of public infrastructure, community and cultural assets in our coastal areas;
- Inform strategic land use planning and policy;
- Inform and guide the protection and management of our natural environment, areas of ecological significance and places of cultural importance;
- Encourage sharing of information, partnerships and collaborations across the community in caring for the Cairns coast and progressing adaptation actions;
- Position Cairns to continue to be the business, tourism and services hub of Far North Queensland and ensure it reputation as the world's best place to engage with nature, thereby providing confidence to investors and tourists.

6 linkages to other corporate strategies

The OCC Strategy is an important part of Council's long-term planning and strategic framework.

The OCC Strategy aligns with other key Council strategies and plans to deliver a strong resilient economy, community and environment:

- Corporate Plan
- Climate Strategy 2030
- Cairns Plan 2016
- Local Disaster Management Plan
- Shoreline Erosion Management Plan
- Economic Development Strategy
- Local Government Infrastructure plan.
- Biodiversity Strategy
- Reef Guardian Action Plan
- Regional Flood Risk Assessment
- Water Security Strategy
- Water Demand Management Strategy
- Cairns Water Supply Drought Response Plan

The OCC Strategy will provide important direction for maintaining the well-being and vibrancy of our communities, the protection of our outstanding natural environment and coastal landscape, strengthening our region's economic prosperity, supporting strong community education and awareness, facilitating informed decision-making and embracing innovation.

OUR COMMITMENT TO BUILDING THE RESILIENCE OF OUR REGION

Cairns Regional Council is engaged in several initiatives to build resilience in our region. Tropical expertise and climate adaptation and resilience are two key sectors underpinning the aspiration for Cairns and Far North Queensland (FNQ) region to become the Capital of the Smart Green Economy in Australia. Pursuing this objective has the potential to secure significant private sector investment, which, in turn will support economic growth, innovation, diversification, resilience and deliver a range of environmental and social benefits for the region, Queensland and Australia as a whole.

CRC is preparing a Climate Change Strategy 2030 to take an integrated approach to Council's climate risk reduction response, including identifying pathways for Council to further reduce its greenhouse gas emissions and ways to support our communities to adapt to climate change impacts.

The OCC Strategy provides the direction and priority actions needed to progress adaptation and proactively support the community in building resilience to coastal hazard risks, including the effects of climate change now and into the future



7 developing the strategy

The OCC Strategy has been developed in several stages (in line with the QCoast2100 Minimum Standards and Guidelines) with extensive engagement, community consultation and expert advice at each phase.

COMMIT & GET READY

PHASE 1

Plan for life of project stakeholder and community engagement

PHASE 2

Scope coastal hazard issues for areas of interest

COMMUNITY & STAKEHOLDER ENGAGEMENT

IDENTIFY & ASSESS

PHASE 3

Identify areas exposed to current and future coastal hazards

PHASE 4

Identify key assets potentially impacted

PHASE 5

Undertake risk assessment of key assets in coastal hazard areas

COMMUNITY & STAKEHOLDER ENGAGEMENT

PHASE 6

Identify potential adaptation options

PHASE 7

Undertake socio-economic appraisal of adaptation options

PHASE 8

Strategy development, implementation and review

COMMUNITY & STAKEHOLDER ENGAGEMENT

COMMUNITY & STAKEHOLDER ENGAGEMENT

COMMUNITY & STAKEHOLDER ENGAGEMENT

PLAN, RESPOND & EMBED



Councillor tour of Cairns coastline



Engagement with Traditional Custodians (Djabugay shown here)



JCU Coastal tour



Council engagement at local markets

8 engagement & community values

In developing the OCC Strategy, we have drawn on extensive community consultation, technical mapping and expert cultural and scientific advice.

Engagement was undertaken at key points throughout the development of the strategy through community and business surveys, workshops, coastal site tours and meetings.

We engaged with community and industry stakeholders, our local disaster management group, regional government managers and the education sector for feedback on coastal values, the assets that were important to them and proposed adaptation options.

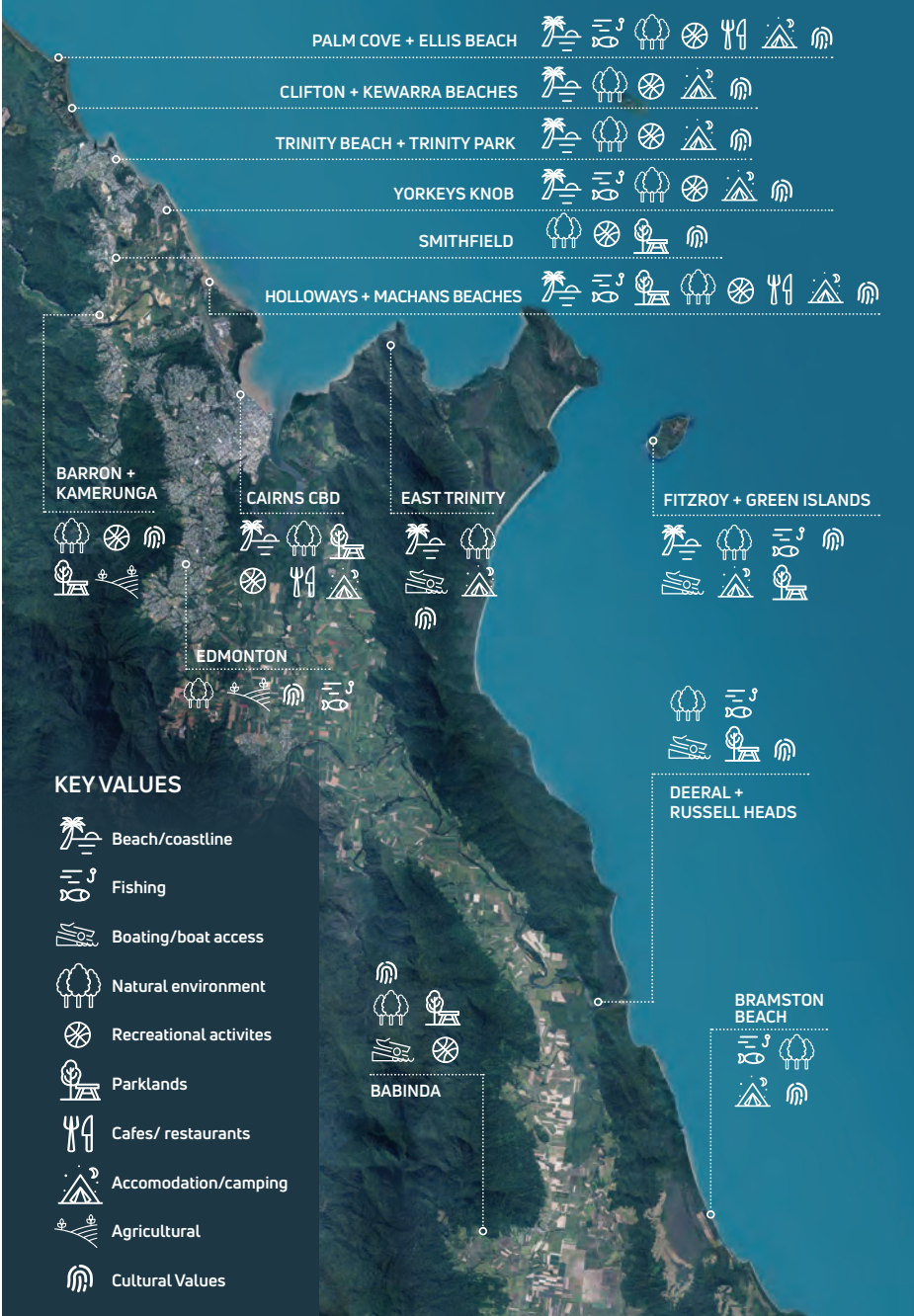
Individual meetings were held with key asset owners in localities subject to future coastal hazard risk to share information and collaborate on solutions.

Traditional custodians were engaged in each of the key coastal localities and shared valuable knowledge on cultural values and the traditional management of local areas and environments.

School and university groups were engaged through curriculum-linked presentations, coastal tours, working with researchers and providing invitations to our workshops to build knowledge and capacity.

The top community values identified were the natural environment and access to the coast. The most valued aspects of the coastal environment were natural assets including habitats and wildlife, sandy beaches, foreshores, dunes, reserves and open space. Cairns people also valued easy access to the beach.

All feedback has been important in informing the adaptation options and priority actions for the Cairns region.



OVER 1,200 PEOPLE ENGAGED

400+ community survey responses

10+ workshops with First Peoples

15+ internal Council officer workshops and Councillor briefings

12+ key stakeholder workshops and various one-on-one meetings

5+ community group workshops

7 pop-up stalls at markets, ECOfiesta and Cairns Show





DEFINING RISK
 Risk = likelihood of a
 hazard occurring
 x consequence of impact if
 it does occur

9 understanding the risks of coastal hazards

A key concept of this strategy is 'risk'. A risk is the chance of something happening that will have a negative effect. Risks can be direct (e.g. inundation of a road) or indirect (e.g. inundation that isolates a community). Risk can be to people's safety, the natural environment, buildings, public infrastructure, private property, community facilities, places of social and cultural importance or to our lifestyle and economic prosperity.

Risks can be assessed across a range from low to extreme and are the combination of likelihood (probability that a coastal hazard may occur) and the consequence of it occurring (anticipated impact of the coastal hazard). To ensure we are able to adapt and respond to coastal hazards as they occur in our region, it is important we prepare for the varying levels of risk that these hazards will have in our community.

OUR COASTAL HAZARD RISKS WILL CHANGE OVER TIME IN RESPONSE TO A CHANGING CLIMATE, WHICH MAKES MONITORING VITALLY IMPORTANT.



LEVELS OF RISK

LOW

An example of a low risk event is one that is **UNLIKELY TO OCCUR** and/ or has insignificant impact to human life and property

MEDIUM

An example of a medium risk event is one that is **LIKELY TO OCCUR** and/ or has a moderate impact to human life and property

HIGH

An example of a medium risk event is one that is **VERY LIKELY TO OCCUR** and/ or has catastrophic impact to human life and property

10 identifying areas and assets at risk

In developing the OCC Strategy, we have mapped the predicted extent and impact of coastal erosion, storm tide inundation and periodic inundation from sea level rise on the Cairns community at 20-year intervals - 2020, 2040, 2060, 2080 and 2100.

This coastal hazard extent mapping supported the identification of assets exposed to coastal hazards and monitoring of impacts and changes over time. This mapping is available to view on the Our Cairns Coast webpage www.cairns.qld.gov.au/ourcairnscoast and will be updated as new and updated climate science becomes available and / or changes are made to legislative or statutory requirements.

These technical studies assessed coastal hazard risks for the whole of the Cairns region, as well as risks specific to 14 different localities. Each coastal community has varying exposure to coastal hazards and will be impacted in different ways. Detailed studies of specific areas focussed on priority natural areas and community and public assets such as buildings, foreshore parks, roads and other important utilities.

Being aware of an increasing risk profile means we have time to prepare, respond and implement adaptation actions between now and over the coming decades to mitigate the step-change and avoid impacts before it occurs.

PREDICTED IMPACTS IN THE CAIRNS REGION

Under current climate conditions less than 1% of our region's urban areas and 2% of other areas are affected by coastal hazards. Storm tide inundation and sea level rise are the dominant coastal hazards affecting our region. These impacts are proposed to increase over time to the extents shown below.

BASED ON A 0.8M RISE IN SEA LEVELS

	Coastal erosion	Sea-level rise	Storm-tide inundation
Industrial areas	<1% (0.4 ha)	18% (252 ha)	25% (335 ha)
Retail and commercial areas	<1% (2 ha)	23% (81 ha)	67% (171 ha)
Tourism areas	3% (8 ha)	24% (44 ha)	40% (65 ha)

For all other areas (community facilities, conservation, future urban, rural, open space and sporting areas, and residential land), less than 2% of the region is affected

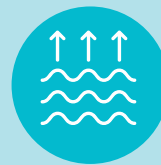
Data, analysis and engagement identified **11,000 coastal assets** that were important to the community.



This was narrowed down to **588 priority assets**

by excluding private and commercial assets, and applying a ranking criteria. The criteria included cost, community value, biodiversity value, aesthetics and economic factors.

The coastal hazard that has the potential to impact the largest number of prioritised assets is storm tide inundation, affecting 588 prioritised assets. Sea level rise is expected to impact 423 prioritised assets and coastal erosion is expected to impact 71 prioritised assets.



Based on a projected sea level rises by 0.8 metres by 2100, the following key assets would be at risk of coastal hazards (including tidal inundation) in the Cairns region:

- 9 beaches
- 27 coastal infrastructure items (i.e. boat ramps
- 1 surf lifesaving club
- 1 Council administration office
- 58 government / tourism buildings of significance
- 50 community assets
- 29 tourist accommodation or tourist attractions
- 145 vegetated areas
- 85 parks and nature reserves
- 4 foreshore park areas
- 30 recreation areas
- 14 emergency facilities
- 30 vulnerable people facilities (i.e. childcare, aged care and disability services)
- 15 schools or colleges
- 6 caravan parks
- 5 carparks
- 1 port area
- 5 marinas and wharves
- 1 airport
- 6 cultural sites
- 3 cemeteries
- 3 golf clubs
- 11 health facilities
- 1 research facility
- 23 industry parcels
- 3 infrastructure areas
- 6 pump stations
- 1 waste transfer station
- 4 treatment plants
- 4 depots
- 1 landfill
- 1 animal shelter

The Cairns city and inner suburbs locality is the most at-risk coastal locality due to the higher population density in this area and high exposure of facilities and services, including regionally-important and vulnerable infrastructure such as the Cairns hospital.

Datasets used to identify assets at risk included council asset databases, data from external infrastructure and asset providers (e.g. State agencies, hospital, airport, seaport) and the Cairns Plan2016 land use zoning.



11 our adaptation hierarchy

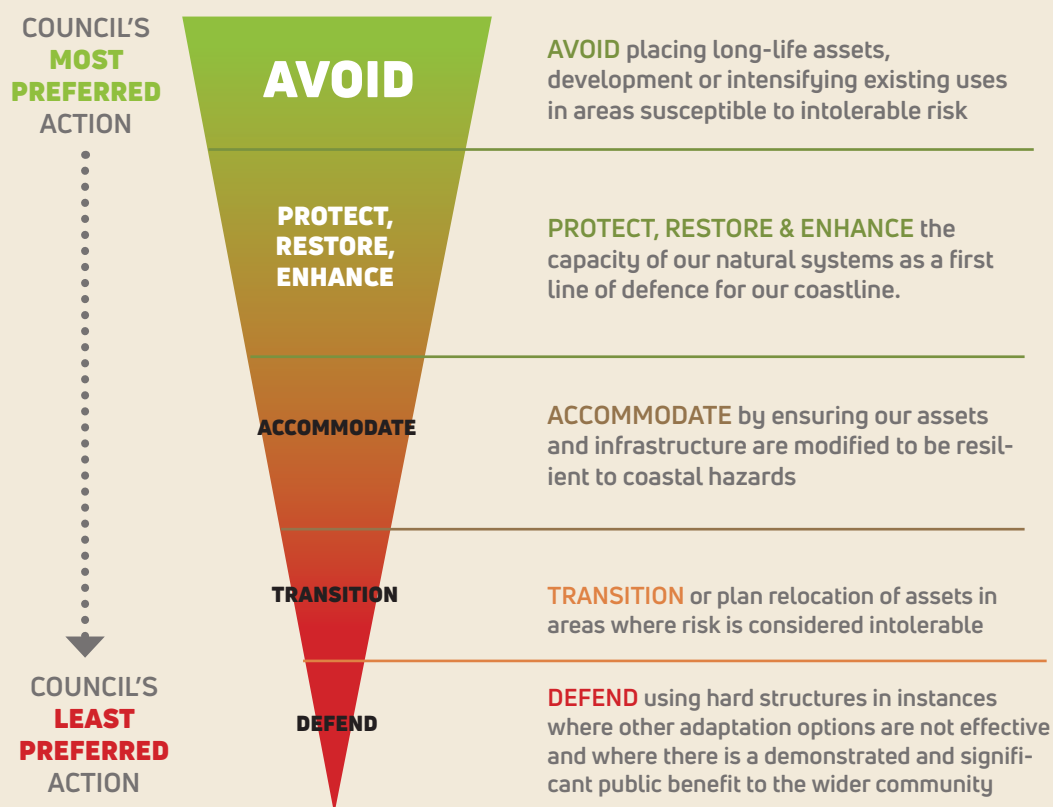
We have many options to respond to coastal hazards, ranging from revegetation and other ecological approaches, to engineering solutions like seawalls, right through to transitioning and relocating assets.

To decide which options work best at which time and place, we refer to the 'adaptation hierarchy' which provides a priority of adaptation. The hierarchy favours avoidance, protection and restoration options as a first approach

in adapting to coastal hazards.

Preferred options are those that will be prioritised or the short term, however less preferred options will be implemented when they become necessary.

FIG 1: COUNCIL'S ADAPTATION HIERARCHY



12 our adaptation response

Ten key actions and approaches will be used to manage and protect our coastal communities now and in the future. This suite of local adaptation options was informed by Council officers, stakeholder and community engagement and a multi-criteria analysis (MCA).

The MCA process was an important tool to compare and prioritise the various options using environmental, social and economic criteria. Implementing these actions will assist us to maintain and improve, modify, and plan for transition as needed when sea level rises. As community attitudes and coastal

hazard risks change over time, local adaptation options will also evolve.

Further investigation of options may involve detailed site investigations and use of decision-making tools such as cost-benefit analysis (CBA) to help inform the preferred adaptation option and which option provides the most

appropriate environmental, social and economic benefit overall.

The OCC Strategy is our guide for deciding the types of adaptation responses needed in each locality and when they need to be implemented based on science and monitoring changes over time.

MAINTAIN AND IMPROVE

The OCC Strategy includes a range of priority whole of coast adaptation actions that will be implemented over the lifetime of the strategy. These actions are under the theme of 'Maintain and Improve'.

The maintain and improve approach involves the continued use of an asset at the current risk level and where the risk profile is considered low enough to be acceptable.

These actions rely strongly on regular monitoring to understand the extent of coastal change at the local level, and to identify when actions should be implemented.

These actions also include building on activities and programs often already being undertaken such as community awareness raising, active management of natural areas and ecosystems, emergency response, land use planning and asset management. While these actions do not always directly reduce the risk of coastal hazards, they are important to improve and strengthen the resilience of our coast and communities over time.

1

MONITOR

Undertake monitoring to observe coastal changes and determine if trigger points are being reached for the implementation of adaptation actions.

2

NATIVE VEGETATION AND HABITAT MANAGEMENT

Support and strengthen natural coastal habitats, dune processes and protect and restore degraded wetland habitat through habitat management programs such as planting vegetation on dunes and within and around wetlands and waterways.

3

COMMUNITY AWARENESS AND EDUCATION

Build community understanding, awareness and resilience for coastal hazard risk adaptation by providing ongoing information and messaging about coastal hazards, risks, monitoring and adaptation actions.

4

EMERGENCY RESPONSE

Emergency management procedures should be in place and updated to consider future climate change related scenarios across Cairns. These procedures include monitoring and warning systems, maintaining evacuation routes and community engagement.

5

PLANNING CONSIDERATIONS

Implementing land use planning responses that are risk appropriate for the location in the coastal hazard area. Land use and development policy, zoning and development controls can be used to maintain the current risk profile in areas of acceptable and tolerable risk.



MODIFY

The **modify** approach uses physical measures to accommodate and **mitigate** coastal hazard risks to an acceptable or tolerable level. These actions include various engineering (soft and hard) options and hazard resilient design measures to protect/upgrade assets and reduce the impacts of coastal hazards. Over time, monitoring may indicate that the modify option is no longer effective in accommodating or mitigating coastal hazard risks and other approaches may be needed.

6

BEACH AND FORESHORE MANAGEMENT

This can include, dune construction and restoration, beach nourishment, and beach scraping.

7

MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

Allow for continued use of infrastructure, buildings and assets where the coastal hazard risk is tolerable, but when upgrading or building new assets, the design is to be resilient to or accommodate coastal hazard impacts.

8

COASTAL ENGINEERING

Using hard engineering solutions to protect beaches, foreshore and creek front areas from coastal hazards including levees / dykes, seawalls / scour protection, groynes and artificial headlands / reefs, tidal flaps or valves on stormwater pipes, and tidal gates

PLANNED TRANSITION

The planned transition approach applies to the **staged relocation or repositioning of assets in specific areas** that have an intolerable exposure to high risk. This approach is intended to facilitate change in how we use and manage land in very high-risk areas, and includes actions relating to physical infrastructure and policy. These actions include the managed relocation of assets and infrastructure out of areas exposed to very high coastal hazard risk, as well as a range of policy responses to reflect a risk-appropriate approach to land use planning and change into the future.

9

RELOCATE INFRASTRUCTURE

Critical Council assets, infrastructure and buildings that are located in hazard areas could be relocated to lower-risk areas or outside of the coastal hazard extent area when they reach the end of their life or need significant renovation if it has a long-life design

10

ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

Embrace natural coastal processes without intervention or change to current management arrangements, including:

- Accept loss of land affected by coastal hazards on unprotected shorelines.
- Allow coastal dunes and habitats to migrate landward.
- Allow dunes to recede without intervention and accept there will be damage or loss to infrastructure.

13 our strategic decision-making principles

Together with the adaptation hierarchy, Council has agreed on a set of principles that will guide our decision-making. These principles also set Council's responsibilities in relation to coastal hazards, and the limits of these responsibilities.

VALUES DRIVEN RESPONSES

- | | |
|----|---|
| V1 | The significance of ecological values and coastal ecosystems to the community must be considered when responding to coastal hazards. |
| V2 | Cultural and community values will be considered when responding to coastal hazards. |
| V3 | Traditional Custodians long-standing expertise and knowledge of land, sea and country and its application to adaptation responses in natural area contexts, should be valued. |

ENGAGEMENT

- | | |
|----|--|
| E1 | Council will engage with stakeholders when planning to address coastal hazards and outcomes of engagement will be one of the inputs into decision making with consideration of technical analysis and science. |
|----|--|

GOVERNANCE, RESPONSIBILITY AND RISK

- | | |
|----|---|
| R1 | Coastal hazard management is a collective responsibility requiring collaboration and the sharing of information between all levels of government, the private sector, community and other key stakeholders. |
| R2 | Current science, data, information on coastal hazard risks and the Principles for Adaptation will be considered across all areas of Council's governance, policy, decision-making, planning, infrastructure, investment, operations, asset planning and management and emergency response to improve the future resilience of the Cairns community. |
| R3 | Council, with support from other levels of government is responsible, for: <ul style="list-style-type: none">• Actively monitoring priority coastal hazard areas in collaboration with the community;• Using evidence and expert advice in addressing coastal hazards;• Managing the impacts of coastal hazards on Council owned assets and services, in conjunction with beneficiaries; and• Maintaining public access and community services where practicable. |
| R4 | Council is not responsible for managing coastal hazard impacts on: <ul style="list-style-type: none">• Private property or assets;• Non-Council owned public assets or property; and• Private assets located on council managed land; Exceptions to the above will be considered on a case by case basis, where a significant public benefit can be demonstrated and any works are undertaken in conjunction with beneficiaries. |
| R5 | Private property owners are responsible for: <ul style="list-style-type: none">• Occupying coastal hazard areas at their own risk;• Managing risks to their property from coastal hazards; and• Paying for coastal protection works where they are the beneficiaries. |
| R6 | It is accepted that, at times, some existing communities may be temporarily isolated or inaccessible as result of coastal hazard impacts. |



SAFE COMMUNITIES

- S1 Human safety is paramount. Areas of unacceptable risk should be identified and exposure to risk avoided. If risk is unavoidable, risk should be minimised through adaptation solutions or planned transition and retreat pathways should be identified.
-
- S2 The community will have access to up-to-date climate change and coastal hazards information to build their risk awareness, resilience and capacity for informed decision-making.
-

PLANNING AND IMPLEMENTATION

- P1 Adaptation decisions will be informed by a balanced consideration of environmental, social, economic, financial and governance factors to benefit the community now and in the future. These adaptation decisions will be based on trigger points and thresholds that arise.
-
- P2 Natural ecosystems services and 'soft' nature-based solutions which complement the green tropical landscape of the Cairns region will be used in the first instance, where appropriate to address the level of risk.
-
- P3 The adaptation hierarchy for Cairns (to be implemented in order of preference, see Figure 1) is:
1. Avoid
 2. Protect, restore and enhance
 3. Accommodate
 4. Transition
 5. Defend
-
- P4 Where engineering solutions are required, they are designed to integrate with the natural environment where possible and improve amenity.
-
- P5 Public coastal land will not be available to private property owners for private coastal protection works, except where:
- significant public benefit is demonstrated;
 - there are no adverse impacts to public land assets or the natural environment;
 - works do not worsen any impacts of coastal hazards; and
 - private property owners pay for the works and ongoing maintenance.
-
- P6 New development or intensification of existing development and Council assets should be avoided in areas of unacceptable coastal risk on private or public land unless significant public benefit is demonstrated, the land use is appropriate for the location and risks are managed to an acceptable level.
-



WHAT IS AN ADAPTATION PATHWAY?

An adaptation pathway is a decision supporting timeline for implementation of adaptation options.

It is based on projected sea level rise and erosion triggers. These triggers will be determined by on- the-ground monitoring and gathering data on actual coastal hazard impacts rather than set years.

Planning and implementation of adaptation options will commence when these triggers are reached.

14 local adaptation pathways

The OCC Strategy includes a range of adaptation actions that should be implemented across the entire coast, as well as pathways for each unique locality to support community values and address local risks.

Detailed technical studies, mapping and adaptation planning has been completed for 14 localities in Cairns as shown on Figure x (following page with map showing locations and page numbers). Each locality plan shows the projected hazard mapping at 2100 (or 0.8m sea level rise), outcomes of engagement including community

values and preferred responses and the proposed adaptation options pathways.

A monitoring program, as well as a community awareness and education program, will be fundamental to underpin the implementation of the adaptation option pathways at a coast-wide and local levels.

The local adaptation option pathways included within this strategy provide an indicative, sequenced approach to the implementation of adaptation options to respond to coastal hazard risks and impacts. Trigger points for adaptation actions are linked to projected sea level rise and indicative coastal hazard extent mapping for five planning horizons – 2020, 2040, 2060, 2080 and 2100.

AROUND 2040-2060

AROUND 2080 AND BEYOND



SHORT TERM

CURRENT COASTAL HAZARD RISKS 0-0.3M SEA LEVEL RISE



MEDIUM TERM

COAST HAZARD RISKS AT 0.3-0.6M SEA LEVEL RISE



LONG TERM

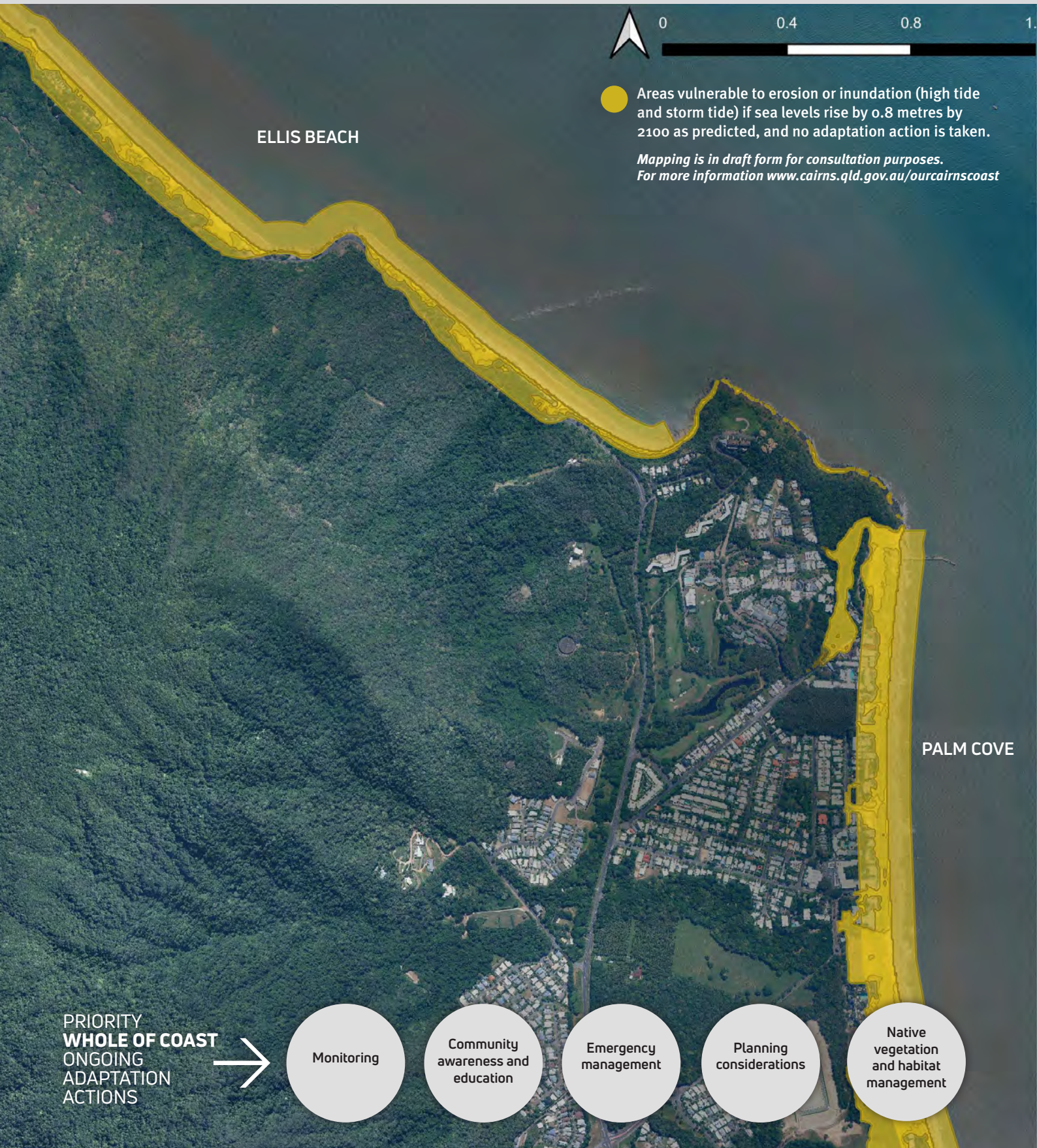
COAST HAZARD RISKS AT MORE THAN 0.6 SEA LEVEL RISE

The suite of local adaptation option pathways will need to be further considered in association with the views of the community at the time and will be subject to further investigation, including, for example, cost benefit analysis, to inform the preferred option at the time.



PALM COVE + ELLIS BEACH

Approximately 27km north of Cairns CBD, Palm Cove is a popular tourist destination and beachside village containing cafes, retail stores and resorts along the its esplanade. Nearby Ellis Beach, a tiny 5km stretch of coast, is best known for its surf club and camping facilities.





COMMUNITY ASSETS AT RISK BY 2100

- The Palm Cove shoreline is relatively stable, however is vulnerable to erosion events due to a very narrow buffer between the active beach and development, e.g. foreshore areas adjacent to Williams Esplanade
- Ellis Beach is relatively stable, however like Palm Cove has a limited buffer to coastal processes and is vulnerable to erosion events
- Storm tide inundation is expected to impact the largest number of assets with the number of assets at risk expected to increase over time

- **Beaches**
- **Foreshore parks and caravan parks (e.g. Ellis Beach Oceanfront Bungalows and Palm Cove campground)**
- **Surf lifesaving infrastructure**
- **Various roads (e.g. Williams Esplanade, Cedar Road and Veivers Road)**
- **Supporting services (e.g. sewer and water networks)**

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Open coast
- Coastal vegetation and parklands
- Restaurants and amenities
- Melaleuca heritage trees along the esplanade

COMMUNITY ADAPTATION PRIORITIES

- Restoring wetlands to protect wildlife habitat
- Planning policy responses to provide a suitable buffer zone to coastal hazards
- Vegetation and dune management / construction
- Avoiding further intensifying development in public land along the esplanade

Local Adaptation Pathways to respond to coastal hazards

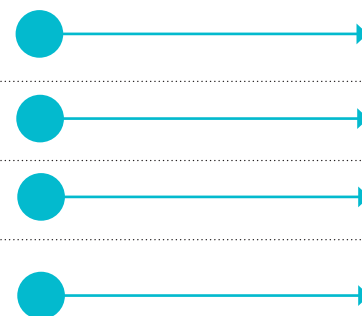
(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM 0-0.3m	MED TERM 0.3-0.6m	LONG TERM >0.6m
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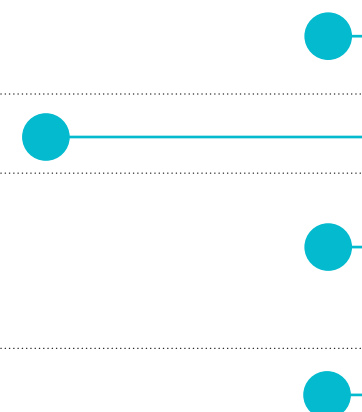
BEACH & FORESHORE MANAGEMENT

- Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)
- Beach scraping as required to reinforce dunes and reduce risks of erosion scarps
- Beach nourishment focused on the southern end of Palm Cove to allow sand to naturally distribute along the beaches
- Dune construction at the northern end of Palm Cove (near the jetty and foreshore park) as a priority where there is the greatest concentration of public infrastructure



MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Relocate the sewerage pump station and two toilet blocks in Palm Cove outside the coastal hazard extent once they reach the end of their design life
- Develop local adaptation plan for foreshore incorporating nature based solutions
- Update existing foreshore park assets to be resilient to coastal hazards or locate new assets outside the coastal hazard area (e.g. caravan park in Palm Cove). In Ellis Beach, preference should be given to locating new development and public assets on the western side of the highway
- Manually change land levels within coastal inundation hazard areas to reduce risk for new or upgraded public assets.



CLIFTON + KEWARRA BEACHES

Clifton Beach and Kewarra Beach, approximately 23 km from the CBD, are home to more than 8000 people. These communities boast picturesque quiet beaches, parklands and a mix of housing, retail and businesses.



- Clifton Beach has experienced persistent shoreline recession resulting in a loss of dunes
- A 550m long rock seawall and beach nourishment works at Clifton Beach has been undertaken to reduce further impacts from coastal hazards
- Historical planning responses have ensured that development along Kewarra Beach is well setback from the shoreline
- Kewarra Beach has experienced recent coastal erosion impacts in some areas

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Open coast
- Restaurants and amenities
- Beachside palm trees
- Ecological areas with Flying Fox habitat

COMMUNITY ADAPTATION PRIORITIES

- Restoring wetlands to protect wildlife habitat
- Planning policy responses to provide a suitable buffer zone to coastal hazards
- Vegetation and dune management / construction
- Avoiding further intensifying development in public land along the esplanade

Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

BEACH & FORESHORE MANAGEMENT	• Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)	
	• Beach scraping as required to reinforce dunes and reduce risks of erosion scarps	
	• Beach nourishment on both beaches as required	
	• Dune maintenance and enhancement seaward of Arlington Esplanade and north of the seawall along Clifton Beach, and along areas of Kewarra Beach	
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN	• Develop local adaptation plan for foreshore incorporating nature-based solutions	
	• Relocate existing community infrastructure that is at the end of its design life, such as public toilets and paths near Clifton Beach and Kewarra Beach and the sewage pump station on Kewarra Street to reduce their exposure to coastal hazard risks	
	• Relocate existing foreshore park assets that need updating or locate new assets outside the coastal hazard area	
	• Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded public assets. This should focus on public land along Arlington Esplanade at Clifton Beach that may become inundated from Euston Close Reserve	
COASTAL ENGINEERING	• Maintain existing foreshore and shoreline structures (e.g. existing seawall at the southern end of beach and foreshore retaining wall at Deadmans Gully Park)	
	• Construction of a seawall at Clifton Beach to protect roads	
	• Small groynes to complement beach nourishment and hold sand in target areas as required	
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES	• Allow erosion of the foreshore in areas that do not have critical public assets, such as Deadmans Gully Reserve	

TRINITY BEACH + TRINITY PARK

Trinity Beach and Trinity Park are northern coastal communities 20km north of Cairns. Key features of these suburbs include the popular Earl Hill walking track, a marina, canal estates and foreshore dining and retail along Trinity Beach esplanade.



- Historically, the northern end of Trinity Beach suffered from erosion which resulted in construction of a rock seawall to protect the road
- Trinity Beach is relatively stable and protected by Taylor Point and Earl Hill
- Trinity Beach has a vegetated buffer between land-based assets and the shoreline which gradually narrows from north to south.
- Most areas of Trinity Park affected by coastal hazards are vegetated sites with lower-lying canal residential areas at highest risk
- Trinity Park Beach has experienced erosion since the construction of the entrance to Bluewater Canal.
- Entrance to the canal at Bluewater Estate has to be dredged regularly to keep access open

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Beaches and waterways
- Earl Hill tracks and trails heads at Trinity Park Beach
- Taylor Point
- War heritage
- Mangrove and native ecological areas

COMMUNITY ADAPTATION PRIORITIES

- Restoring wetlands to protect wildlife habitat
- Planning policy responses to provide a suitable buffer zone to coastal hazards
- Vegetation and dune management / construction
- Beach and foreshore management and monitoring (i.e. beach nourishment)
- Retain conservation areas south of Earl Hill

Local Adaptation Pathways to respond to coastal hazards

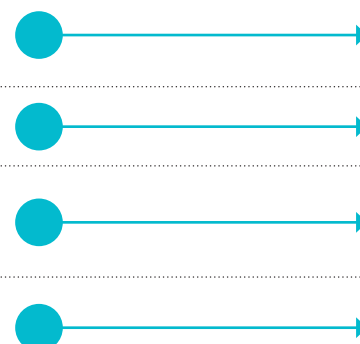
(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

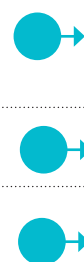
BEACH & FORESHORE MANAGEMENT

- Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)
- Beach scraping as required to reinforce dunes and reduce risks of erosion scarps
- Continue beach nourishment on Trinity Beach using sand dredged from Bluewater Channel and undertake small-scale beach nourishment at Trinity Park if required
- Dune construction to public areas on the southern end of Trinity Beach due to the narrow buffer between the shoreline and land-based assets



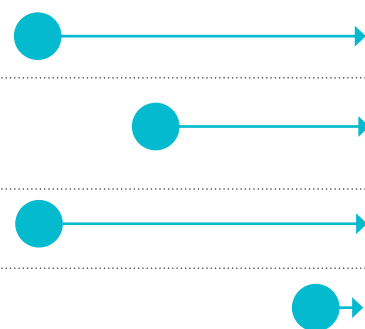
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Plan to update or relocate existing infrastructure, including three sewerage pump stations and two public toilet blocks at Trinity Beach and nine sewerage pump stations at Trinity Park to be resilient to coastal hazards
- Relocate existing foreshore park assets that need updating or locate new assets outside the coastal hazard extent
- Manually change public land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded assets. This should be focused on Coastline Parade Park



COASTAL ENGINEERING

- Maintain the existing rock retaining structure at the entrance to Half Moon Creek
- Extend existing rock retaining structures where required to protect public land, road and assets where dune management and beach nourishment is not viable
- Large groyne required to eliminate further shoreline recession near Bluewater Channel
- Tidal gate may be required near the mouth of Half Moon Creek at Trinity Park



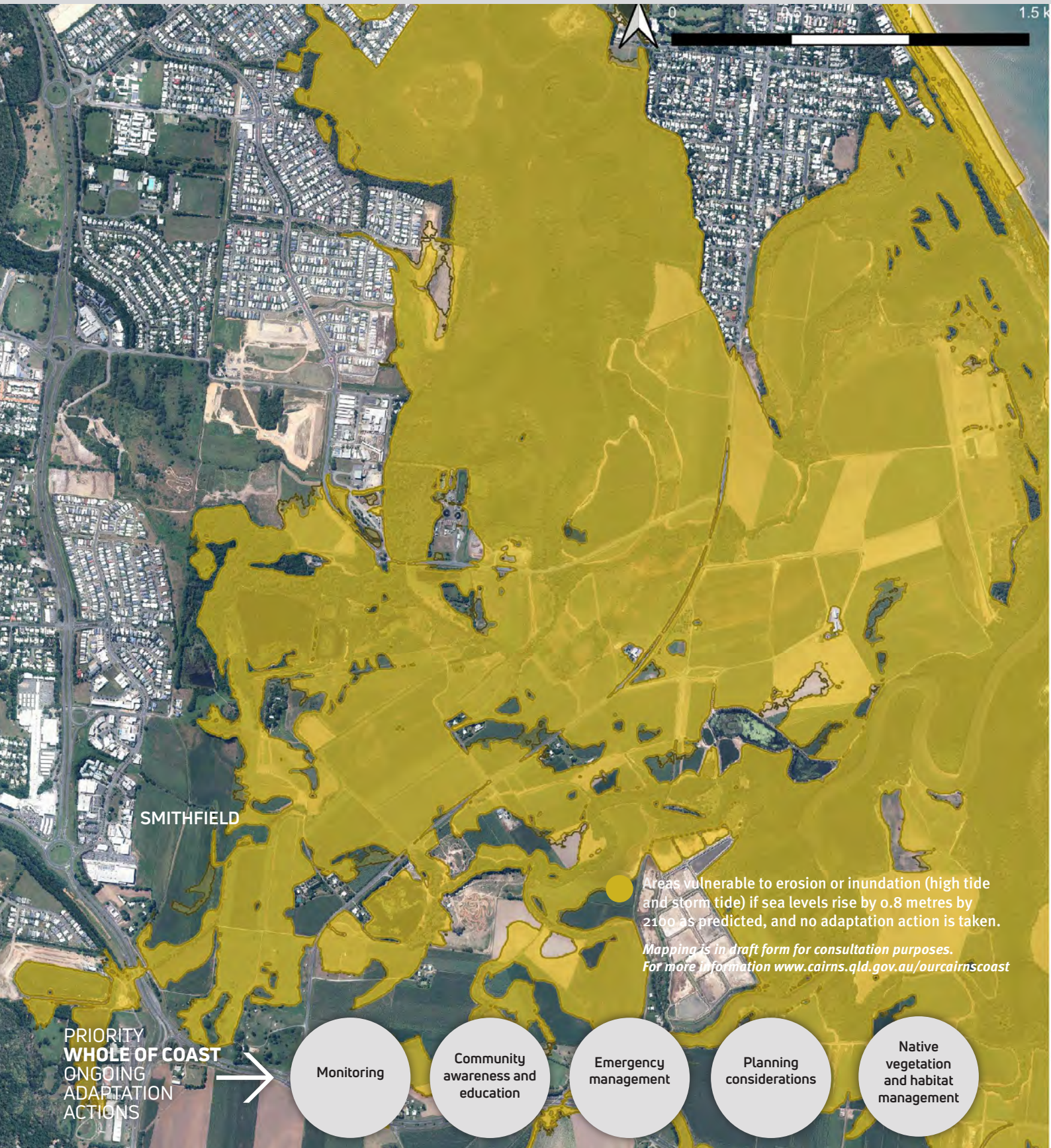
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Allow erosion of the foreshore in areas that do not have critical community assets, such as the vacant shoreline areas in Trinity Park



SMITHFIELD

Smithfield is a thriving centre area located 15 km north of Cairns between Trinity Park and Kamerunga, home to more than 5000 people, and considered the business and trade centre of Cairns' northern beaches.





- Smithfield is vulnerable to inundation from coastal hazards due to the low-lying land adjacent to watercourses
- Important infrastructure and assets are at risk from coastal hazards

COMMUNITY ASSETS AT RISK BY 2100

- Marlin Coast Wastewater Treatment Plant
- Smithfield Transfer Station
- Open space areas (e.g. Oakville Parade Park, Cattana Wetlands Environmental Park)
- Industry areas
- Tourism and Community infrastructure (e.g. Skyrail Rainforest Cableway)
- Various roads and services (e.g. sewer and water networks)

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Bushland
- Agricultural land
- Cattana Wetlands
- Mountain bike park
- Shopping centre

COMMUNITY ADAPTATION PRIORITIES

- Restoring and migrating wetlands to protect wildlife habitat
- Avoid long-life assets in coastal hazard areas
- Planning policy responses to retain conservation areas
- Raising road levels to mitigate impacts from inundation
- Investigation into coastal hazard impacts on key infrastructure (i.e. transfer station, waste water treatment plant)

Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

BEACH & FORESHORE MANAGEMENT

- Plan to update or relocate existing public infrastructure that is at the end of its design life, including a sewerage pump station, wastewater treatment plant, waste transfer station, roads and services to reduce their exposure to coastal hazard risks
- Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded public assets. This should focus on evacuation routes including, Captain Cook Highway, Yorkeys Knob Rd and Dunne Rd and Smithfield Bypass (by asset owner).



MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Protect public infrastructure by constructing protection works (e.g. engineered walls) seaward of valued assets to hold the shoreline in the current position and reduce inundation impacts
- Tidal gate across Yorkeys Creek and / or Half Moon Creek to decrease inundation in Smithfield which will protect low-lying assets in the area



ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Progressively review or relocate public infrastructure as inundation encroaches on assets



YORKEYS KNOB

Yorkeys Knob is a quiet coastal community located 13 km from Cairns, separated from residential areas to the west by wetlands and farmland. The township has a mix of low to medium density housing, foreshore parklands with playground, accommodation, a golf club, boating club and marina.



- Historically, Yorkeys Knob beach has experienced significant erosion where southward alongshore sand movement occurred depleting the beach and accreting the beach north of Richters Creek
- A groyne was built in 1960 at the northern end of Yorkeys Knob beach to help stabilise the shoreline following severe cyclone erosion
- Currently dunes provide adequate protection for shoreline change with no engineering structures required
- Important infrastructure and assets are at risk from coastal hazards

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Beach and foreshore recreational areas
- Bluewater and Yorkeys Knob Marinas
- Half Moon Bay Golf Course and Yorkeys Knob Boating Club
- Mangroves and fish habitat at river mouths

COMMUNITY ADAPTATION PRIORITIES

- Restoring wetlands to protect wildlife habitat
- Creek mouth management
- Avoid long-life assets in coastal hazard areas
- Small groynes and seawalls along the beach
- Dune vegetation and management
- Landfill management review

Local Adaptation Pathways to respond to coastal hazards

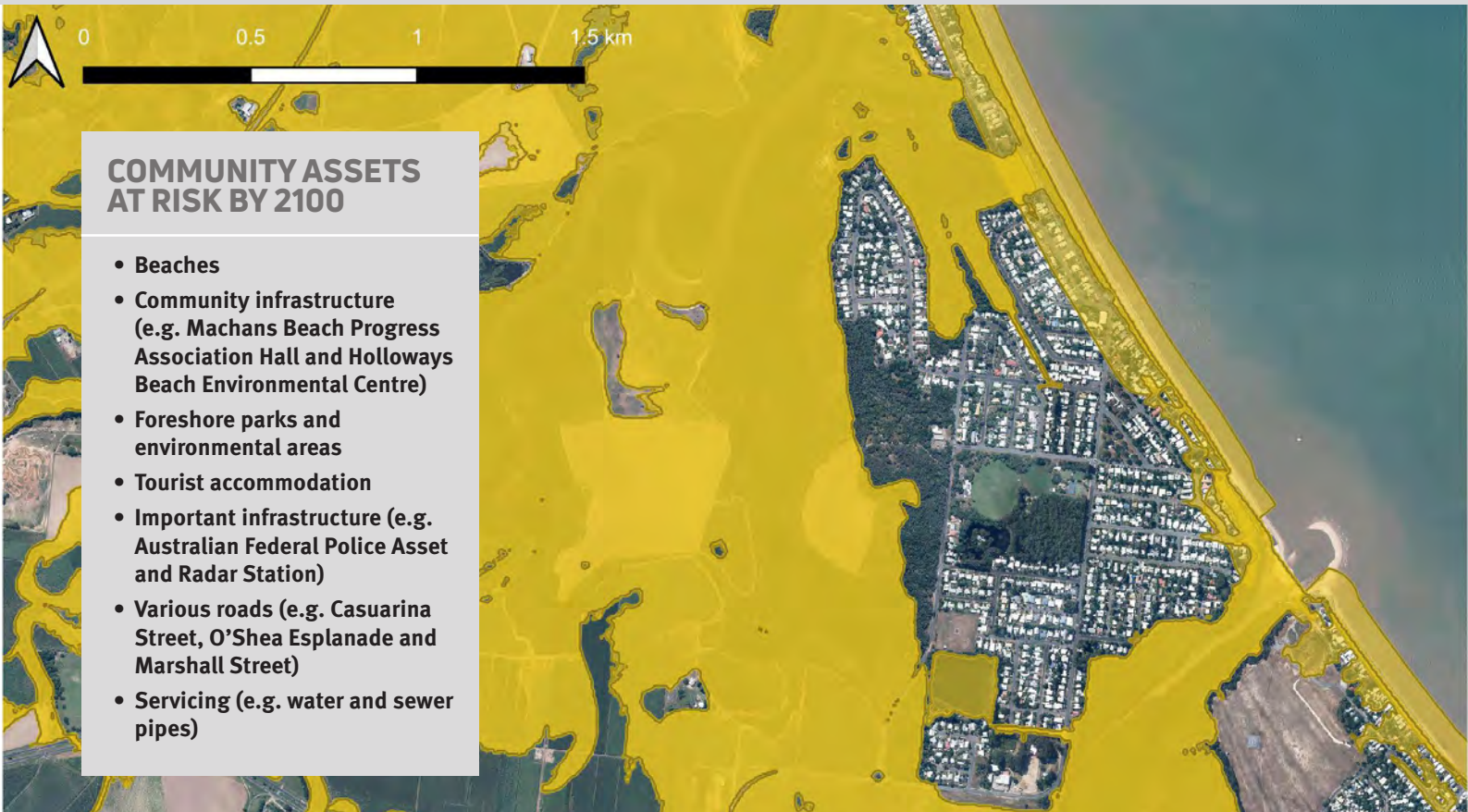
(For community assets, based on monitored sea level rise)

SHORT TERM 0-0.3m MED TERM 0.3-0.6m LONG TERM >0.6m

BEACH & FORESHORE MANAGEMENT	• Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)	
	• Beach scraping as required to reinforce dunes and reduce risks of erosion scarps	
	• Beach nourishment to protect against erosion and maintain / improve beach amenity	
	• Dune construction focused on the public foreshore adjacent to Sims Esplanade where there is minimal natural buffer	
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN	• Plan to update or relocate existing public infrastructure that is at the end of its design life, including nine sewage pump stations, two public toilet blocks and lengths of sewerage and water pipes	
	• Relocate existing foreshore park assets that need updating or locate new assets outside the coastal hazard extent	
	• Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded assets. This should focus on Sims Esplanade	
COASTAL ENGINEERING	• Maintain or upgrade the existing groyne at the northern end of the beach	
	• Seawall to protect public assets along Sims Esplanade and a breakwater to protect Yorkeys Knob marina where dune management and beach nourishment are not viable	
	• Tidal gate may be required near the mouth of Half Moon Creek at Trinity Park	
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES	• Allow erosion of the foreshore in areas that do not have critical assets, such as the spit near the entrance to Yorkeys Creek	
	• Progressively review or relocate infrastructure as inundation encroaches on assets. This may be a last resort option for areas along Sims Esplanade and around Half Moon Bay Golf Club	

HOLLOWAYS + MACHANS BEACHES

Holloways Beach and Machans Beach are the northern beach suburbs closest to Cairns city and to the airport. These localities are well loved for their beaches, recreational activities, fishing spots, estuaries, wetlands, coastal cafes and sense of community.



HOLLOWAYS BEACH

MACHANS BEACH



- Erosion has occurred along Holloways Beach causing a narrowing of dunes that protect shoreline development
- Beach nourishment works have occurred at Holloways Beach which is typically placed seaward of the rock revetment to protect residences along Hibiscus Lane and maintain the foreshore. Recent groynes have been installed to reduce the need for sand nourishment.
- Creek entrances have typically supported the sand supply at Machans Beach however, a rock seawall built in 2016 has assisted in continuing to stabilise the beach. This has resulted in sand being deposited at the northern end of Holloways Beach which is used as a source for sand nourishment.

WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Traditional Custodian values
- Beach and foreshore recreational areas
- Mangroves and fish habitat at river mouths
- Littoral rainforest

COMMUNITY ADAPTATION PRIORITIES

- Creek mouth management
- Dune vegetation management
- Coastal engineering in specific areas (i.e. tidal gate, levee)
- Planning considerations
- Maintain or enhance extent of current wetlands
- Modify existing infrastructure to be resilient to coastal hazards

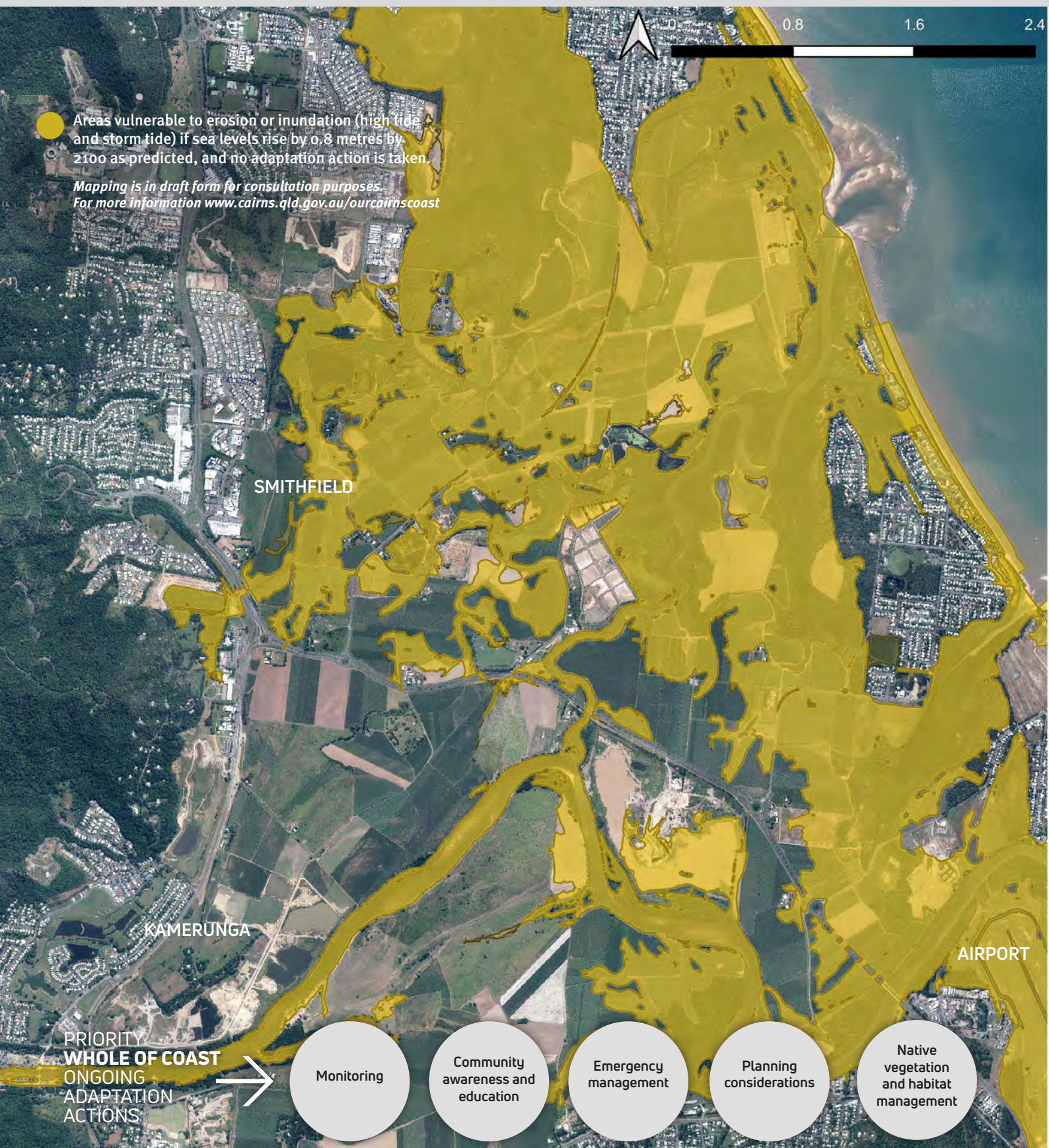
Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

		SHORT TERM 0-0.3m	MED TERM 0.3-0.6m	LONG TERM >0.6m
BEACH & FORESHORE MANAGEMENT	• Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion) focusing on Redden Island.			
	• Beach scraping as required to reinforce dunes and reduce risks of erosion scarps			
	• Undertake or continue beach nourishment to maintain beach width and visual amenity of public foreshore			
	• Dune construction along foreshore where dune crest is minimal			
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN	• Plan to update or relocate toilet blocks and sewage pump stations, the boat ramp at Holloways Beach at end of design life, and ensure roads, bridges and trails are resilient to coastal hazards			
	• Relocate existing foreshore park assets that need updating or locate new assets outside the coastal hazard area			
COASTAL ENGINEERING	• Maintain existing structures, including the groynes and seawalls protecting public infrastructure			
	• Seawall may be required if dune management and beach nourishment are not viable, particularly for the southern portion of Machans Beach and Holloways Beach.			
	• Refurbish or realign the existing seawall at Holloways Beach to reduce erosion pressures			
	• Consider small groynes to maximise benefit of beach nourishment, particularly for the northern end of Holloways Beach			
	• Tidal gates around creek mouths as required			
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES	• Allow shoreline erosion where land is undeveloped, particularly to the north of Poinsettia Reserve at Holloways Beach and to the northern end of Machans Beach			

BARRON + KAMERUNGA

Barron and Kamerunga are outer suburbs of Cairns CBD around the Barron River. Key features of these semi-rural low-density residential include the Kamerunga Nature Reserve, Lake Placid and Barron Gorge.





WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Traditional Custodian values
- Farmland
- Green belt separating urban areas
- Barron River delta

COMMUNITY ADAPTATION PRIORITIES

- Modify existing infrastructure to be resilient to coastal hazards
- Planning considerations to retain rural zoning
- Protect vegetation along banks of Barron River and foreshore

COMMUNITY ASSETS AT RISK BY 2100

- Community assets (e.g. Cattana Wetlands and Harley Street North Park)
- Environmental areas (e.g. Kamerunga Conservation Park and Stoney Street Environmental Reserve)
- Various roads (e.g. Kamerunga Road, Captain Cook Highway and Yorkeys Knob Road)
- Servicing (e.g. water pipes)

- The Barron River delta has changed since the mouth switched 1.5km to the north in 1939 from its former position adjacent to Ellie Point
- The area is predominately low-lying and is vulnerable to inundation



Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE
SHORT TERM 0-0.3m **MED TERM** 0.3-0.6m **LONG TERM** >0.6m

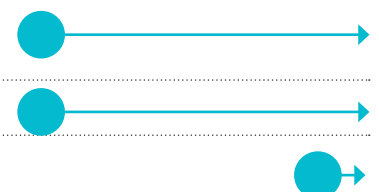
BEACH & FORESHORE MANAGEMENT

- Existing public infrastructure that needs updating or new infrastructure to be installed should be resilient to coastal hazards
- Relocate existing community assets in coastal hazard areas that need updating or locate new assets outside these areas
- Manually change land or road levels where are risk of coastal inundation and this is important to the community e.g. boat ramp car park



MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Levee or bund wall around the waste water treatment plant to reduce exposure to coastal hazards
- A training wall to maintain the position of the Barron River channel
- A levee may be required to prevent low-lying land within Barron from becoming inundated



ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Progressively review or relocate infrastructure as inundation encroaches on assets, particularly for low-lying rural areas



CAIRNS CITY+ INNER SUBURBS



0

0.7

1.4

2.1 km



Areas vulnerable to erosion or inundation (high tide and storm tide) if sea levels rise by 0.8 metres by 2100 as predicted, and no adaptation action is taken.

Mapping is in draft form for consultation purposes.

For more information www.cairns.qld.gov.au/ourcairnscoast

CAIRNS CBD

PRIORITY
WHOLE OF COAST
ONGOING
ADAPTATION
ACTIONS



Monitoring

Community
awareness and
education

Emergency
management

Planning
considerations

Native
vegetation
and habitat
management

Cairns city and inner suburbs includes the CBD, Cairns Esplanade, Botanic gardens, parklands, saltwater creek, Cairns Airport and other transport, commercial, tourism and marine hubs. The centre of Cairns, established on reclaimed swamp land and river delta at Trinity Inlet, and its surrounding inner suburbs house more than 11,000 people.



- The land that the city is located on has progressively been filled by 2 to 4m to raise the elevation above tidal and flood levels
- The city is vulnerable to storm-tide inundation and long-term sea level rise
- The city contains the highest number of priority assets at risk from coastal hazards
- Erosion has effected the foreshore since the 2000's however a seawall and rock wall were constructed to protect the esplanade and boardwalk
- Beach nourishment works have occurred periodically along the northern section of the CBD foreshore

COMMUNITY ASSETS AT RISK BY 2100

- **Foreshore parks**
- **Key infrastructure (e.g. airport, port, marina precinct, hospital)**
- **Industrial areas**
- **Business, tourism and commercial infrastructure**
- **Emergency services and health infrastructure (e.g. Cairns Hospital, ambulance stations, fire stations, community health facilities, police stations and QFES)**
- **Servicing (e.g. water and sewer pipes)**
- **Variety of schools (e.g. Cairns State High School, St Monica's, Trinity Bay State High School, Parramatta State School)**
- **Key utility infrastructure (e.g. Ergon Energy's substation and wastewater treatment plants)**
- **Variety of roads (e.g. Mulgrave Road, Sheridan Street, Comport Street, Anderson Street)**
- **Drainage infrastructure (e.g. Fearnley Street Drain)**



WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Wharf precinct
- Foreshore recreational areas, including lagoon, esplanade boardwalk and picnic areas
- Marine precinct, Navy base and Port area for the economy
- Wetland and nature reserves
- Community assets, such as airport and hospital
- Botanic Gardens and Centenary Lakes
- Unique wildlife and biodiversity
- Public facilities, such as museums and art galleries

COMMUNITY ADAPTATION PRIORITIES

- Creek mouth management
- Vegetation retention e.g. mangroves on the Esplanade
- Coastal engineering works
- Flood resilient infrastructure
- Accessible evacuation routes
- Protection of port area

As part of 'Phase 7 – Undertake socio-economic appraisal of adaptation options', we assessed several potential adaptation options for the Cairns CBD. This work helped us understand the qualitative costs and benefits of different responses. Recognising the complexity of coastal hazards and our coastal environment, as well as the need for workable solutions, Council is committed to undertaking further cost-benefit analyses to ensure any future adaptation measures deliver value for money outcomes and maximise community benefits.

Local Adaptation Pathways to respond to coastal hazards

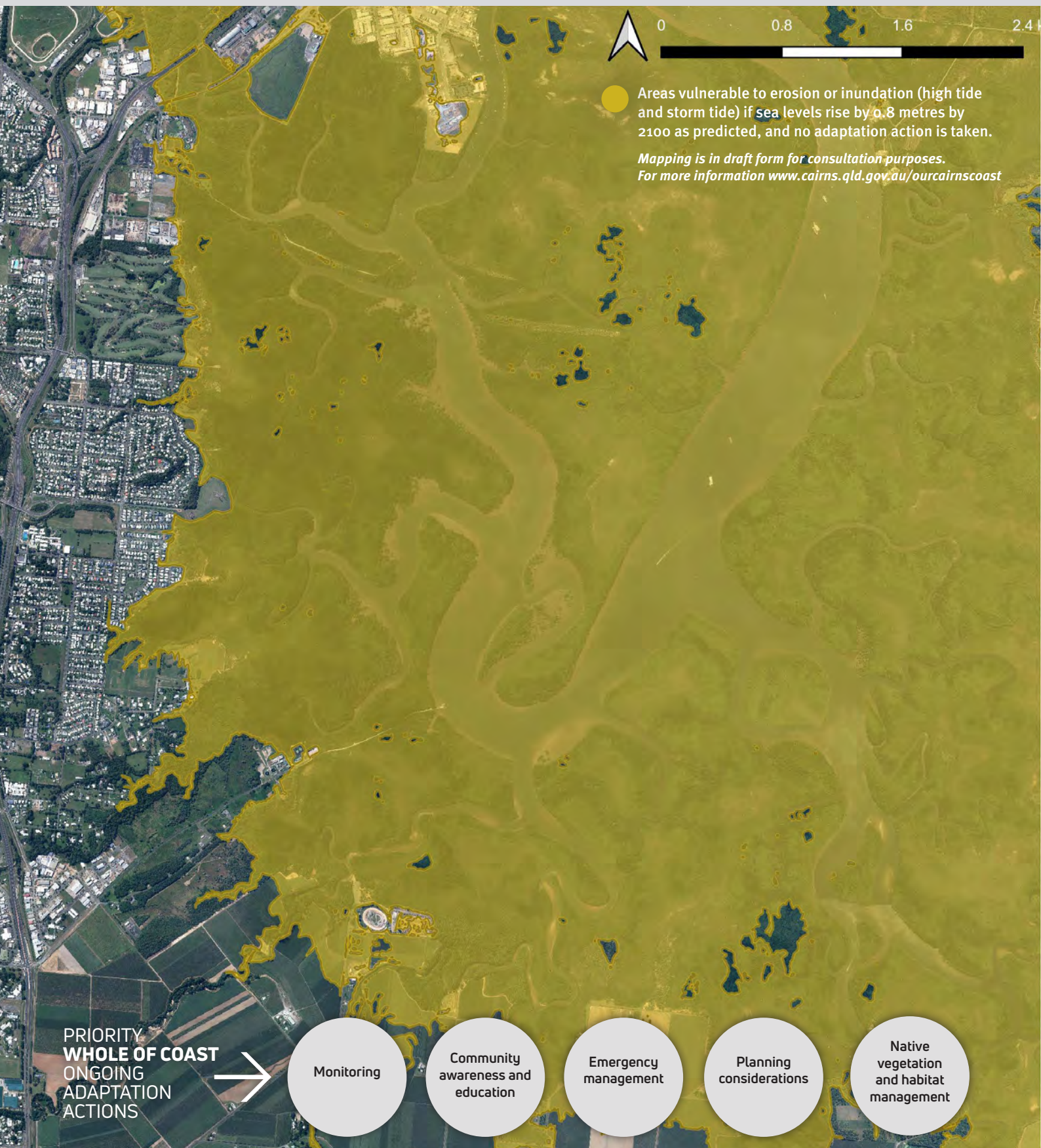
(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE
SHORT TERM 0-0.3m **MED TERM** 0.3-0.6m **LONG TERM** >0.6m

BEACH & FORESHORE MANAGEMENT	• Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)	
	• Beach scraping as required to reinforce dunes and reduce risks of erosion scarps	
	• Beach nourishment to maintain beach width and visual amenity	
	• Develop local adaptation plan for foreshore incorporating nature based solutions such as mangrove with integrated protection responses.	
	• Develop integrated catchment management plans (ICMP) for Saltwater Creek and Fearnley Street drain	
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN	• Plan to update existing infrastructure (e.g. raise infrastructure, bund wall) or locate new infrastructure to ensure it is resilient to coastal hazards and outside inundation extents.	
	• Refurbish or upgrade existing structures to be resilient to coastal hazards which could be undertaken as part of broader Esplanade works	
	• Increase the capacity of flood pumps (mainly in the CBD)	
	• Relocate foreshore park assets to outside the coastal hazard extent	
	• Raise services (e.g. vehicle access points, electricity points) in CRC owned buildings that are likely to be regularly inundated due to sea level rise or storm surges	
	• Investigate a raised road around the city foreshore area to form a levee preventing tidal inundation and allow for effective drainage	
COASTAL ENGINEERING	• Maintain existing seawalls to hold the shoreline in position.	
	• Seawalls may be required along the foreshore and Chinaman Creek to prevent inundation and protect CRC infrastructure.	
	• Small groynes to maximise the benefit of small-scale beach nourishment	
	• Scour protection works along waterways to protect public assets	
	• Investigate tidal gates along the length of the port waterway area to prevent elevated water levels from penetrating into upstream areas	
	• Investigate additional engineering options such as artificial reef and detached breakwater to protect foreshores	
	• Progressively review or relocate public infrastructure as inundation encroaches assets or protection works are not viable or effective	
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES		

EDMONTON

Edmonton is located at the southern end of the region's urban settlement about 15km south of Cairns CBD. Historically, sugarcane was area's primary industry but the area has experienced rapid housing, business and industrial with a population of 10,750 in residential areas and outlying rural properties.



WHAT THE COMMUNITY VALUES

- Traditional Custodian values
- Cane farming lands
- Scenic values
- Trinity Inlet and Admiralty Island for its cultural heritage and ecosystem values
- Protection of wetlands
- Sugarworld water park and recreation area

COMMUNITY ADAPTATION PRIORITIES

- Planning considerations
- Avoid long-life assets in coastal hazard areas
- Modify existing infrastructure to be resilient to coastal hazards

COMMUNITY ASSETS AT RISK BY 2100

- Edmonton Wastewater Treatment Plant
- Community infrastructure (e.g. sports facilities, golf club, parks)
- Parks and environmental assets (e.g. Cracknell Rd Drainage Reserve and Fishermans Rd Park)
- Various roads (48 km within the coastal hazard areas)
- Servicing (e.g. sewerage and water pipes)

- The main township area of Edmonton is outside the coastal hazard extent
- Storm-tide inundation and permanent sea level rise poses severe risk to the greatest number of assets
- Edmonton Wastewater Treatment Plant and Southern Wastewater Treatment Plan are both at risk from coastal hazards



Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Plan and update existing infrastructure at end of design life (e.g. raise infrastructure, bund wall) to be resilient to coastal hazards or locate new infrastructure to be outside inundation areas, particularly relevant for wastewater treatment plants and pump stations
- Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded assets, particularly focusing on the Edmonton Wastewater Treatment Plant
- Levees to hold shoreline in the current position and protect public assets



ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Progressively review or relocate infrastructure as inundation encroaches assets



EAST TRINITY

East Trinity is a tiny coastal community of 212 people nestled in Yidinji traditional Aboriginal country. The area, predominantly covered by vegetation, is bound by Trinity Inlet to the south and west, Pine Creek to the south-west, and mountainous peaks to the east.



WHAT THE COMMUNITY VALUES

- Culturally significant sites
- A natural backdrop to the city
- Natural ecosystems and mangrove habitat
- Boat ramp

COMMUNITY ADAPTATION PRIORITIES

- Beach and foreshore management
- Coastal hazard resilient infrastructure
- Partnering with Traditional Custodians

COMMUNITY ASSETS AT RISK BY 2100

- Environmental areas (e.g. Malbon Thompson Conservation Park)
- Radio receiver station
- Various roads
- Servicing (e.g. water pipes)

- The areas currently have little to no protection from coastal hazards
- The limited development is located on the coastal fringe and is at risk of coastal hazards



Local Adaptation Pathways to respond to coastal hazards

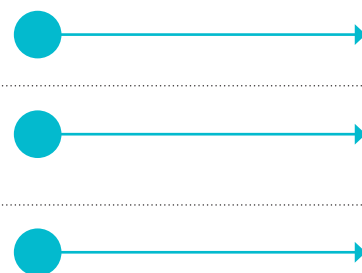
(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

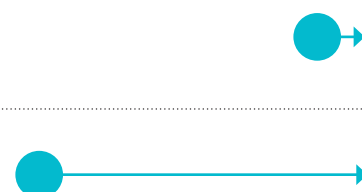
BEACH & FORESHORE MANAGEMENT

- Beach scraping as required to reinforce dunes and reduce risks of erosion scarps
- Dune construction along Pine Creek Yarrabah Road which is within the coastal hazard area to protect the evacuation route in collaboration with the State
- Plan to update or relocate existing infrastructure, including public toilet blocks and linear infrastructure that is nearing the end of its design life to be resilient to coastal hazards



MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Manually change land levels and road levels within coastal inundation hazard areas to reduce risk for new or upgraded assets, including raising sections of Pine Creek Yarrabah Road to be above inundation height
- Protect public assets by constructing protection works seaward of valued assets to hold the shoreline in the current position, focusing on the access road in collaboration with the State



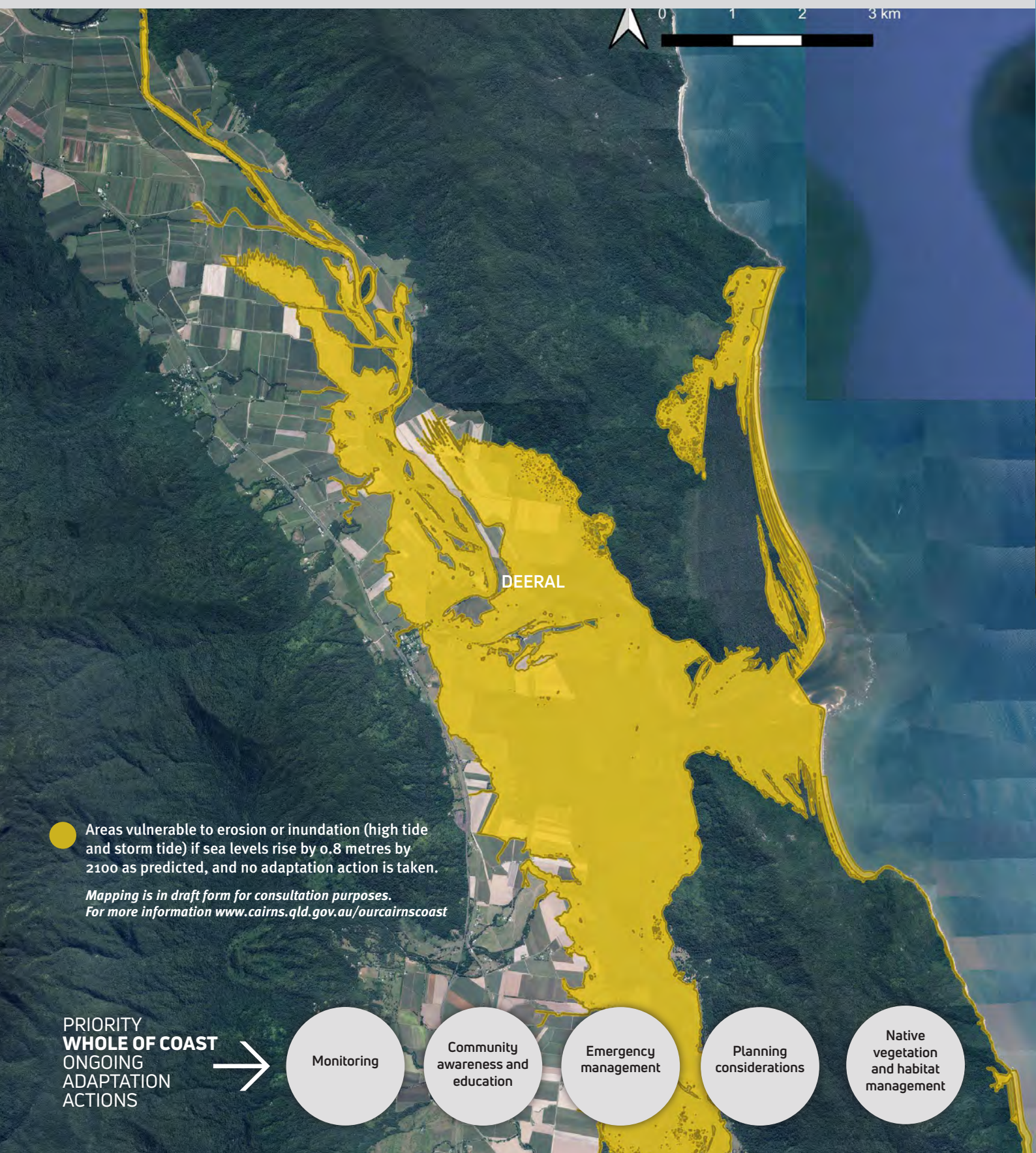
ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Allow erosion of the foreshore in areas that do not have critical public assets
- Progressively review or relocate infrastructure as inundation encroaches on assets



DEERAL + RUSSELL HEADS

Deeral and Russell Heads are located 45 to 65 km south of Cairns CBD in an area dotted with small rural and residential communities connected by the Mulgrave River. The area is also the gateway to the nearby Frankland Islands.





WHAT THE COMMUNITY VALUES

- Access to Frankland Islands
- Boat ramp
- Schools
- Holiday shacks
- Marine plants around the rivers
- Cane farms

COMMUNITY ADAPTATION PRIORITIES

- Planning considerations
- Planned transition and relocation of important assets
- Vegetation management along the length of Mulgrave and Russell Rivers
- Detailed investigation to develop a landfill management review
- Dune vegetation management and dune / beach monitoring

COMMUNITY ASSETS AT RISK BY 2100

- Foreshore parks
- Various road (about 76 kms)
- Supporting services



- Low-lying areas adjoining the rivers are vulnerable to storm-tide inundation and sea level rise impacts
- Cultural and environmental assets as well as important infrastructure are effected by coastal hazards
- Russell Heads beaches are currently stabilised by a 150m groyne
- There is a very narrow foreshore area between the shoreline and development making erosion damage likely during storm events.

Local Adaptation Pathways to respond to coastal hazards
(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

BEACH & FORESHORE MANAGEMENT

- Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)



COASTAL ENGINEERING

- Support maintenance of existing groyne to hold shoreline into position while viable

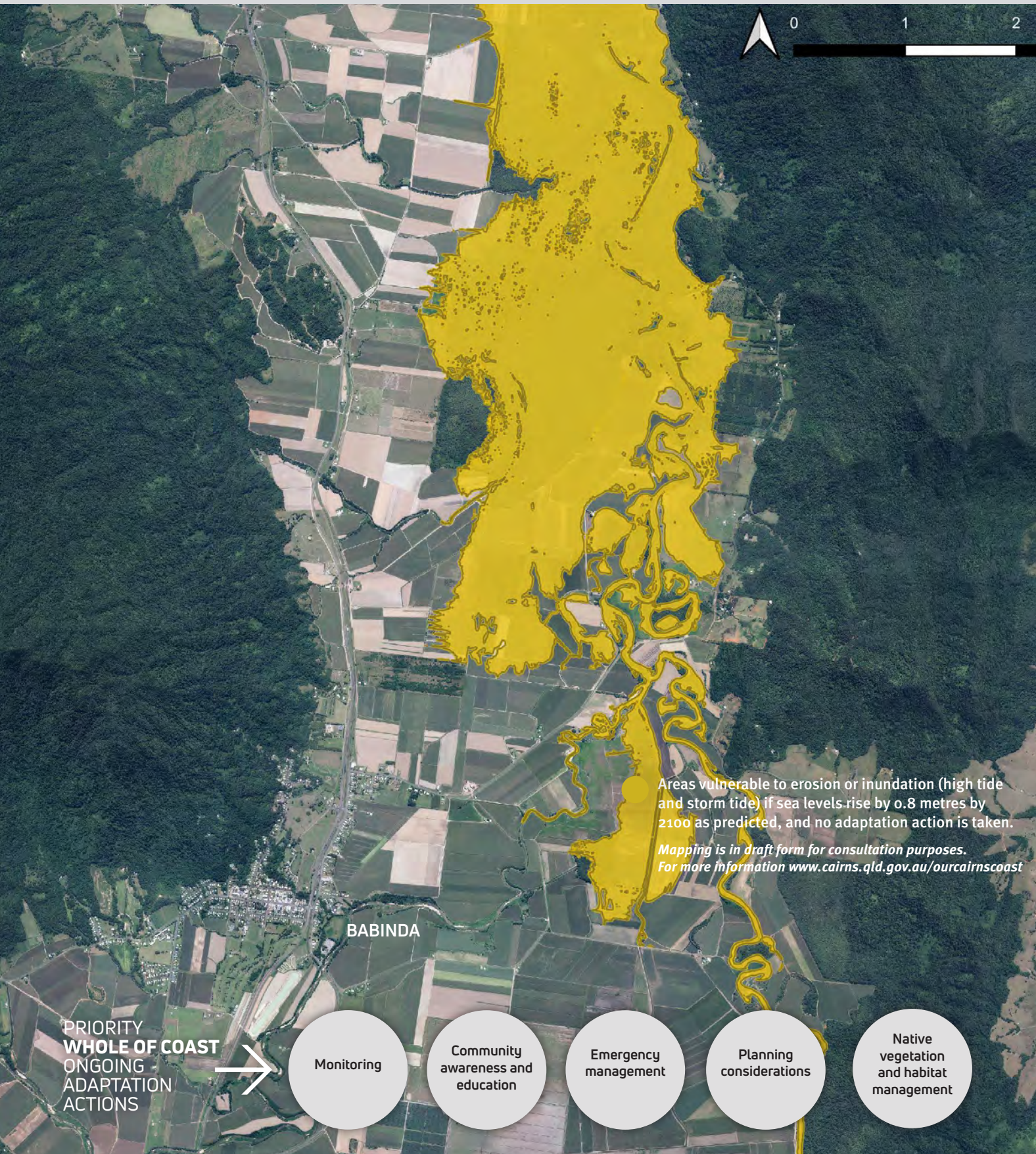


ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Progressively review or relocate infrastructure as inundation encroaches on assets, mainly in foreshore areas on either side of the creek mouth



Rural Babinda and its surrounding townships, 60km south of Cairns city, is in the shadow of Queensland's two highest mountains, Mt Bartle Frere and Mt Bellenden Kerr in Wooroonooran National Park. Key attractions are the Babinda Boulders, Josephine Falls and Eubenangee Swamp National Park – home to over 190 species of birds.





BABINDA

WHAT THE COMMUNITY VALUES

- Boat ramp
- Sugar cane farms
- Cane rail adjacent to rivers
- Tourist attractions (e.g. Babinda Boulders)
- Schools

COMMUNITY ADAPTATION PRIORITIES

- Modify existing infrastructure to be resilient to coastal hazards
- Habitat revegetation along the length of Russell River and in the wetlands



COMMUNITY ASSETS AT RISK BY 2100

- Babinda is at risk of inundation due to its low-lying position
- Priority areas of significant environmental value are at risk from coastal hazards

- Various road (4.7 km)
- Supporting services (e.g. water)

Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Upgrade or relocate existing infrastructure, including Russell River Road and the public toilet block at end of life at Russel River Boat Ramp to be resilient to coastal hazards
- Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded public assets. This is important to ensure that access is maintained to key infrastructure, such as the transfer station, and ensure safe evacuation outside of inundation areas

ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Progressively review or relocate infrastructure as inundation encroaches on assets



BRAMSTON BEACH

Bramston Beach a small beachside town located 80 km south of Cairns directly east of Babinda known for its sweeping sandy beach, open spaces and significant wildlife habitat. The locality is adjoined by rural farmland and the Russell River National Park to the north.



- Bramston Beach is relatively stable and has a wide 70m vegetated foreshore park
- A rock seawall was constructed in 1986 at the end of Bramston Beach Road following repeated storm erosion events
- Important assets at risk include the SES facility and Bramston Beach Transfer Station
- Beach nourishment has historically occurred and dredging is undertaken as needed at Joyce Creek

COMMUNITY ASSETS AT RISK BY 2100

- Bramston Beach Transfer Station
- Community infrastructure (e.g. boat ramp and caravan park)
- Foreshore parks and environmental areas
- Various road (12kms)
- Supporting services (e.g. water pipes)

WHAT THE COMMUNITY VALUES

- Traditional Custodian values
- Important habitat area (e.g. Cassowary and Mahogany Glider habitat and turtle hatching area)
- Eubenangee Swamp
- Marine plants around the waterways
- Holiday homes

COMMUNITY ADAPTATION PRIORITIES

- Vegetation management and habitat protection
- Review planning considerations
- Dune management including vegetation enhancement and augmentation if necessary
- Landfill site investigation
- Creek mouth management

Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

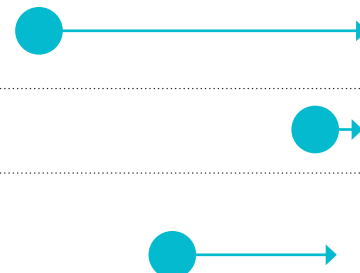
BEACH & FORESHORE MANAGEMENT

- Beach access management (remove unnecessary or informal access, formalise appropriate public paths and inspect and repair access after erosion)
- Beach scraping as required to reinforce dunes and reduce risks of erosion scarps
- Beach nourishment to protect against erosion and maintain / improve beach amenity



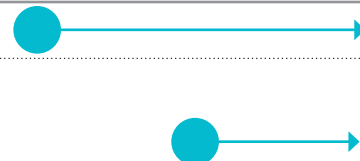
MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Update or progressively relocate existing public infrastructure that is at the end of its design life to reduce exposure to coastal hazard risks
- Relocate existing foreshore park assets that need updating or locate new assets outside the coastal hazard area
- Manually change land levels or road levels within coastal inundation hazard areas to reduce risk for new or upgraded assets. Raising road levels should focus on the Bramston Beach Road and Evans Road intersection.



COASTAL ENGINEERING

- Maintain existing groyne to hold the shoreline in position
- Protect public assets by constructing protection works seaward of public assets to hold the shoreline in the current position. This could include a levee or retaining wall to protect low-lying public assets against inundation from the creek, including the Bramston Beach boat ramp.



ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

- Allow erosion of the foreshore in areas that do not have critical public assets.
- Progressively review or relocate infrastructure as inundation encroaches on asset



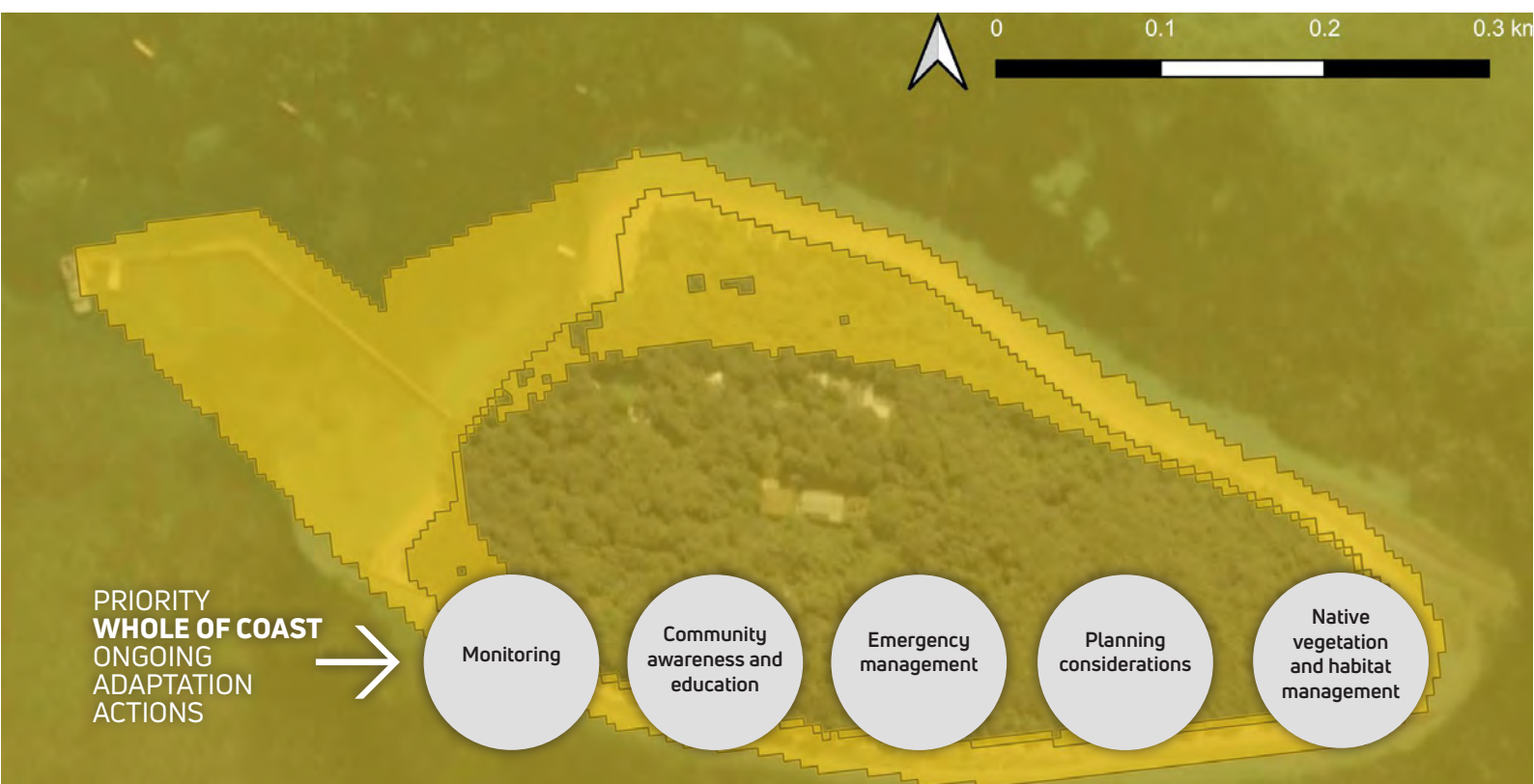
FITZROY + GREEN ISLANDS

Fitzroy Island and Green Island are tropical islands less than an hour's ferry ride from Cairns. They are popular spots for day-tripping and snorkelling and have resort accommodation. 6000 year-old Green Island is the only cay in the Great Barrier Reef with rainforest cover.



▲ FITZROY ISLAND

GREEN ISLAND ▼





WHAT THE COMMUNITY VALUES

- Culturally significant sites
- Fitzroy Island for its turtle rehabilitation and coral restoration
- Green Island jetty
- Boating
- Scenic natural environment
- Coral and sea life
- Recreational opportunities, including snorkelling, camping, fishing, swimming and diving
- Tourist opportunities
- Beaches

COMMUNITY ADAPTATION PRIORITIES

- Dune vegetation management
- Dune and beach monitoring
- Review planning considerations

COMMUNITY ASSETS AT RISK BY 2100

- Beaches
- Tourist development
- Jetties
- Helicopter pad at Green Island
- Community infrastructure (e.g. public toilet)

- Both islands have experienced erosion which has been managed by CRC and private tourist operators
- Temporary and permanent inundation from coastal hazards is a risk for some areas, particularly on Green Island

- Sand bags have been installed in some areas of Fitzroy Island and concrete block walls have been installed on either side of the Green Island jetty to control inundation

Local Adaptation Pathways to respond to coastal hazards

(For community assets, based on monitored sea level rise)

TIMING BASED ON SEA LEVEL RISE

SHORT TERM	MED TERM	LONG TERM
0-0.3m	0.3-0.6m	>0.6m

MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN

- Relocate existing low-cost infrastructure if impacted by coastal hazards



ACCEPT THE RISK AND EMBRACE COASTAL PROCESSES

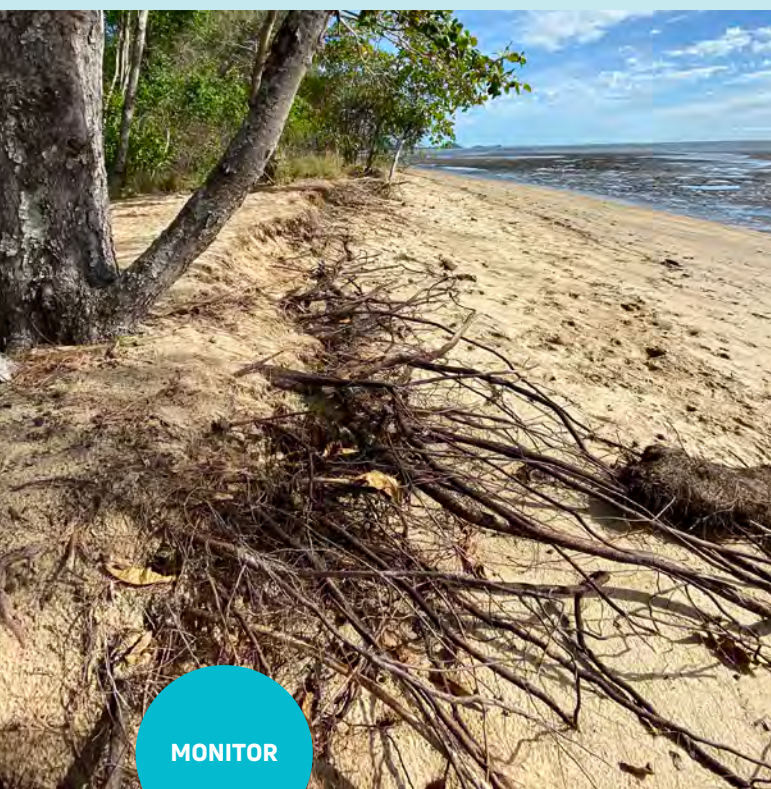
- Progressively review or relocate infrastructure as inundation encroaches on asset



15 strategy implementation plan

This section provides a summary of short term implementation actions

WHOLE OF COAST ADAPTATION RESPONSE & IMPLEMENTATION ACTION



MONITOR

Monitoring will be critical to understanding how coastal hazards and their risks are changing over time. As the coastline changes so should the adaptation actions we take to respond.

Each locality with an adaptation pathway will have a monitoring and review program to determine if trigger points for adaptation action remain relevant, effective, timely and cost appropriate. The extent and condition of beaches, dunes, water levels, vegetation stabilisation and degree of impact from storm events should be monitored in the long term to inform decision-making.

RESPONSE

- Establish a photo monitoring program across the coast, prioritising key sites and localities.
- Establish a monitoring program of beaches and associated dunes, vegetation and sea level rise.
- Undertake monitoring for key select areas.

COMMUNITY AWARENESS AND EDUCATION

Ongoing knowledge sharing, awareness and education is key to enhancing community understanding of coastal processes, changing coastal hazards and risks and adaptation actions.

Being 'risk aware' of climate change and coastal hazards can build resilience in the community through communication and messaging and empowering people to respond.

Council will also strongly advocate for collaboration and partnerships with all levels of government, Traditional Custodians, business, industry, key infrastructure providers, other stakeholders and community to share information and the responsibility in delivering adaptation actions.

RESPONSE

- Develop an active community awareness and education program to ensure ongoing communication and participation with our communities.
- Identify existing and new networks to share and promote knowledge, new information and understanding of coastal hazard risks and adaptation.
- Share information and provide guidance to business and other land/asset owners and stakeholders to foster a proactive response to building their resilience to coastal hazard impacts.
- Prepare awareness and guidance material to support private property owners, business and residents improve their resilience e.g. fact sheets, online videos, information kits on resilient building design, existing Queensland Government resources and tools etc.
- Establish and strengthen partnerships with Traditional Custodians and other community groups to support and implement adaptation actions, particularly ecosystem-based responses such as habitat, dune, wetland and riparian restoration and monitoring activities.
- Facilitate training and education workshops, community awareness raising, community events across the region and for high-risk localities.



EMERGENCY RESPONSE

Emergency preparedness, response and disaster management is everyone's responsibility. Council, State Emergency Service, volunteers and the Local Disaster Management Group, are particularly key in leading the response to keep the community safe. Council's Local Disaster Management Plan (LDMP) provides information on preparation, response and recovery to potential coastal hazard events. Council will review and update the LDMP to ensure it considers future climate change and coastal hazard risks across the Cairns region.

In the medium term, consideration will also be given to planned relocation of our emergency management facilities and infrastructure to ensure they are accessible to staff/volunteers and can provide critical services for our community.

RESPONSE

- Review and update the Cairns Local Disaster Management Plan to integrate updated coastal hazard mapping and risk assessment in emergency management and response planning.
- Review and update emergency management responses for identified short term and higher risk areas for key localities.
- Review emergency management infrastructure for implications of short, medium and long-term coastal hazard risks to ensure they are appropriately located, remain accessible and can function and operate during and immediately after a disaster event.
- Collaborate and share information with the SES and other key stakeholders to develop a plan for the coordinated protection, upgrade or planned relocation of emergency management infrastructure and SES facilities.
- Monitor frequency and nature of emergency management responses and call outs.

EMERGENCY MANAGEMENT

Over time, many of our roads currently identified as priority evacuation routes, are likely to be inundated more regularly from storm tide inundation or rising sea levels. This will have significant implications for our communities if the need for evacuation arises. Council will review the evacuation road network to understand whether priority evacuation routes are appropriately located or designed to support efficient and safe evacuation for our communities. We need to consider both coastal hazards and flood risk implications for our evacuation routes.

RESPONSE

- Review and evaluate the effectiveness of the evacuation road network and identify management actions to support safe and effective evacuation of the community. Examples of management actions may include changes to priority roads identified as evacuation routes, signage, community and stakeholder engagement and design/engineering modifications.
- Investigate implications of catchment flooding and rainfall on coastal hazard risks and evacuation routes.
- Investigate implications of evacuation route modifications or upgrades on increased flooding and changes to overland flow resulting in impacts on other assets



Protecting, enhancing and restoring native vegetation across our coast, wetlands and estuaries, is a vitally important adaptation action.

Implementing Cairns-wide vegetation management focussing on increasing the resilience of our foreshores, important habitats and natural areas against the effects of climate change, will reduce and delay the need for more expensive and hard engineering responses.

Supporting native vegetation, habitat enhancement and natural asset management programs that is currently being undertaken in areas across our coast and will continue in the future. It provides both ecological and amenity benefits and provides an opportunity to involve and educate the community to manage coastal hazard risks and undertake monitoring.

With some adaptation actions to be applied to our beaches, such as beach scraping and nourishment, we need to be careful to not impact our littoral rainforest, cassowary and turtle habitat areas or migratory shorebirds. Protection of turtle habitat is an important ecosystem adaptation response and we must retain areas of natural beach to allow for turtle nesting/laying and hatching seasons (November to April).

RESPONSE

- **Prepare a Cairns-wide native vegetation management plan to identify priority areas for habitat protection and improvement through new planting that enhances the values, functioning and resilience of habitat areas (e.g. align management of weeds and removal of invasive species with the existing biosecurity strategy, erosion management, river stream improvement works, wetlands and biodiversity corridors).**
- **Maintain and adapt existing vegetation management programs to address climate adaptation using Council, Traditional Custodian groups (including Sea Rangers), community groups and volunteer resources.**
- **Explore ‘hybrid’ solutions integrating ecosystem-based responses and engineered solutions to increase the longevity of options and achieve multiple community benefits.**
- **Investigate options to reduce the extent of hard/impenetrable surfaces (which decreases the amount and extent of runoff from storm-tide inundation events) and to decrease the impacts of increasing temperatures and heat island effects.**
- **Investigate impacts of increased saltwater intrusion into shallow freshwater aquifers, which are essential for supporting vegetation and maintaining freshwater coastal wetlands. Consider options for restricting or preventing water extraction from shallow freshwater aquifers as a means of preventing saltwater intrusion.**
- **Audit the location and frequency of beach management practices such as beach scraping/nourishment and ensure protection or construction works occur outside of turtle laying/hatching seasons and do not impact on migratory shorebirds.**

PLANNING CONSIDERATIONS

Getting our land use and infrastructure planning right, is an important and cost effective adaptation option. Ensuring new, upgraded or replaced assets are appropriately located to avoid high risk areas, is especially important for critical community services, high value or long design life assets and uses involving vulnerable people.

Land use planning establishes certainty for community and development expectations. Council will ensure its strategic planning and development controls are 'risk informed' and land uses are 'risk appropriate' for coastal hazard areas. To help reduce the exposure of people and infrastructure in future coastal hazard risk areas, Council will use a range of measures such as land use and development policy, zoning, density, setbacks, hazard resilient design requirements and minimum floor planning levels.

RESPONSE

- Review planning scheme to include updated coastal hazard mapping and embed risk assessment outcomes into land use and development policy responses.
- Develop a regional growth management plan to guide our future settlement pattern.
- Council to use updated coastal hazard mapping and risk assessment outcomes for deciding new land use and development in hazard areas as part of the development assessment process, once integrated into the planning scheme.

- Integrate coastal hazard risk considerations into all strategic planning processes for future communities, masterplans and structure plan areas.
- Consider the implications of coincident catchment flooding and storm tide inundation flooding for land use and development policy.
- Review and update infrastructure design standards for critical infrastructure to ensure they are appropriate and resilient for coastal hazards and climate change.
- Investigate new Council initiatives such as a broader climate change strategy / policy.
- Review and update stormwater drainage policy to provide an adaptive stormwater management approach to promote natural vegetated buffers and ensure culverts are adequately sized to accommodate both stormwater and water from storm tide and tidal inundation.
- Conduct an audit of operational and closed landfills as part of a landfill management review program to understand implications on coastal hazard risks.
- Review and update asset management plans to understand implications of current and future coastal hazard risks.
- Develop local place-based adaptation plans for key locations incorporating nature based solutions for areas including the Cairns city and inner suburbs, Palm Cove and Clifton Beach.
- Develop integrated catchment management plans (ICMP) for key locations to address coastal hazards and build resilience of natural systems. Investigate ICMP for Saltwater Creek and Fearnley Street drain in the Cairns city.

BEACH & FORESHORE MANAGEMENT

All beaches and foreshores on the Cairns coast are highly valued by the community and are at risk from all coastal hazards in the short, medium and long term.

To ensure they continue to be a focus for immediate and ongoing management, Council is preparing a Shoreline Erosion Management Plan (SEMP) identifying management actions for Cairns' coastal beach communities.

The beach management actions identified in the SEMP will be informed by the Our Cairns Coast Strategy.

RESPONSE

- The review of the SEMP is aligned with the review cycle of the Our Cairns Coast Strategy, to ensure the SEMP aligns with the adaptation principles and directions of this strategy.
- Before implementing beach or foreshore management activities such as beach scraping/nourishment or other protection works, impacts on flora and fauna communities such as turtle habitat and migratory shorebirds are considered.

16 council's ongoing role

The Our Cairns Coast: Adapting for the Future Strategy is an important base from which to continue playing our part in building resilience to coastal hazards and future climate change.

Responding to coastal hazards and caring for our coast, now and into the future, is a shared responsibility involving collaboration between Council, Federal and State Government agencies, Traditional Custodians, businesses, community organisations, private landowners and residents.

Council will provide leadership and advocate for informed and accountable decision-making in its statutory and non-statutory planning processes.

Council will provide direction and guidance to support our communities to strengthen their resilience to climate change and coastal hazard risks through our legislative roles in land use planning and local disaster planning and management.

Council as an asset owner and land manager will ensure assets are appropriately located, designed, constructed and maintained to support our communities with ongoing services and infrastructure.

Council's primary responsibility is in implementing adaptation actions to protect, maintain and manage Council owned land, buildings, infrastructure and assets.

Council is not responsible for managing coastal hazard impacts on private property or non-Council owned public assets or property.

Private landowners and other asset owners/entities are responsible for maintaining their own assets in the context of relevant State and Council policy and statutory requirements.

Council proactively manages the impacts of coastal hazards in partnership with the State Government and our coastal communities. Council's role is as follows:

LAND & ASSET TYPE			
			
COUNCIL'S ROLE	Council owned and managed (e.g. Cairns lagoon)	Public land and assets managed by others (e.g. Captain Cook Highway)	Private assets, such as homes and businesses
INFORM	✓	✓	✓
OBSERVE	✓	✗	✗
PLAN	✓	✗	✗
ACT	✓	✗	✗

Council's role in informing, observing, planning and acting on coastal hazard management in the Cairns community involves:

- Monitoring areas affected by coastal hazards to understand changes and inform protection works using surveying and aerial imagery; and
- Monitoring Council owned and managed assets affected by coastal hazards as part of maintenance programs.
- Informing the community by providing mapping for coastal processes through the CairnsPlan 2016 mapping (updated mapping has been prepared for the Our Cairns Coast Strategy).
- Building resilience to coastal hazard impacts through Council's Disaster Dashboard – a platform on disaster preparedness and response.
- Planning - The CairnsPlan 2016 provides policy guidance and planning controls for land use and development, including management of coastal hazard impacts now and into the future. Council also develops Shoreline Erosion Management Plans for localities on the region's coast.
- Providing resilient community infrastructure- Council's primary responsibility is in implementing adaptation actions to protect, maintain and manage Council owned land, buildings, infrastructure and assets.
- The protection of the coast and management of coastal hazards is also required under State legislation, including the Coastal Protection and Management Act 1995, Planning Act 2016, Fisheries Act 1994, as well as local legislation including the CairnsPlan 2016 and relevant Council local laws.

17 governance

This strategy includes new activities and initiatives to improve our resilience to coastal hazards. Successful implementation of these adaptation actions across many parts of our Cairns coast will require collaboration and partnerships between the State and Federal Governments, Traditional Custodians, other stakeholders, landowners and community.

Council is also identifying key actions and opportunities to integrate adaptation implementation and embed coastal hazard risk considerations into Council's internal governance arrangements, decision making and 'business as usual' activities. These actions will strengthen Council's internal governance arrangements and support

a 'whole of organisation' integrated approach to the consideration of coastal hazard risks and their implications for Council's business.

The Cairns Regional Council's Project Control Group (PCG) and Technical Working Group (TWG) have been instrumental in informing the development of this strategy and in identifying pragmatic and responsive actions to support adaptive change in the organisation to progress implementation of adaptation actions. Moving forward will require the appropriate structures and resourcing to successfully deliver the plan. Actions in the plan will be embedded into 'business as usual' processes and activities, including:

- Corporate and Strategic planning
- Emergency preparedness, response and recovery planning
- Risk management policy and processes
- Asset management programs
- Infrastructure planning and decision making
- Shoreline Erosion Management Plan (SEMP) development and implementation
- Strategic and Land Use Planning including growth management, master planning, foreshore planning, sustainability and climate change planning and updates to the planning scheme
- Community facilities planning
- Parks planning and management

18 implementation planning

An implementation plan, including change management aspects guide how Cairns Regional Council will embed adaptation actions across all Council business areas, programs and processes. This will include reviewing and updating existing plans, strategies, policies and procedures and creating new initiatives and change management activities to support the implementation of adaptation actions.

The implementation plan will provide details on:

- Indicative timeframes for delivery of priority whole of coast and locality-based actions
- Cost estimates (where available) for short-term (5-10 year) actions and potential funding sources
- Council plans, policies, strategies and processes to be updated or created to support action delivery

- Governance, processes and resourcing
- Monitoring and evaluation approaches
- Partnership and collaboration opportunities with the community, other stakeholders and external infrastructure providers

19 review and update

This strategy will be reviewed every 5 years and concurrently with the Planning Scheme review to enable updated technical information to inform strategic land use planning and infrastructure forward planning processes.

The strategy review process should consider the following:

Success of progressing implementation or delivery of actions to date, such as:

- Reducing and effectively managing coastal hazard risks;
- Integration of coastal hazard risk considerations into Council governance and decision-making

processes, including updates to Council strategies/plans and documents;

- 'On the ground' delivery of action or progress towards their implementation; and
- Community and stakeholder awareness, feedback and attitudes.

Triggers to update the strategy and supporting action plan, particularly where new information and knowledge about coastal hazard risks and climate change becomes available, include:

- Any changes to the legislative, planning and policy framework (e.g.

the State changes the sea level rise projections (currently 0.8m out to 2100) to be considered in planning or how coastal hazards are defined etc.)

- Significant new development in the region or changes to the coastal landscape and landform; and
- Updated technical information including coastal hazard modelling, risk assessment, monitoring data or changes to coastal hazard indicators.

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