

EVOLVING WITH OUR COAST

DRAFT CASSOWARY COAST COASTAL HAZARD ADAPTATION STRATEGY

 Cassowary Coast
REGIONAL COUNCIL



Cover image credit: Tourism Tropical North Queensland





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MAYOR'S MESSAGE

Hi I am Mark Nolan, Mayor of the Cassowary Coast Regional Council and I am proud that our Council is taking the important step of assessing the regions vulnerabilities to coastal hazards adaptation options to mitigate the impacts of these hazards into the future.

Our region enjoys worldwide recognition of its incredible scenic beauty framed within two spectacular World Heritage Areas – the Wet Tropics rainforest of Far North Queensland and the Great Barrier Reef Marine Park. The Cassowary Coast is one of the few locations where both can be experienced in their relative natural state side-by-side.

As our climate changes, Council wants to ensure our coastal communities remain resilient and safe and ready for coastal hazards such as cyclones, coastal erosion, storm-tides, and sea-level rise. Preserving our way of life for future generations of Cassowary Coast residents and visitors.

The region has already seen firsthand the effects of major weather events not only historically but also in recent living memory through tropical cyclones Winifred, Larry and Yasi. Many of our resident have lived through these events and know the impact they can have not only on our lifestyle but also our environment, economy and communities for many years after.

An important component of strategy is understanding what's important to our local communities and how they value and use our coastal areas.

There is no one-size-fits-all solution in the response to coastal hazards in our region, however the solutions which have been developed have endeavoured to find the right balance between people, liveability and the environment.

The strategy puts Council in a better position to plan and manage the future impacts associated with sea level rise in our urban coastal communities as we head into the future.

Yours Sincerely



Mark Nolan
Mayor Cassowary Coast Regional Council



VISION

THE CASSOWARY COAST IS A RESILIENT COMMUNITY AND REGION – informed and aware about our changing coast. We work together to support the safety, liveability and sustainability of our coastal environment, economy and community.

We use the best information available, to make informed decisions in the best interests for our whole community and environment, and while the coast will evolve, our deep connections will endure.





INTRODUCTION

The Evolving with Our Coast Strategy provides a long-term plan to guide how we can adapt, manage, and increase our resilience to the impacts of coastal hazards, and create a pathway for a sustainable future.

OUR COAST

Positioned in the heart of Queensland's Wet Tropics between Townsville and Cairns, the coastal region of the Cassowary Coast covers over 120 kilometres of spectacular coastline and several offshore islands. Stretching from Innisfail in the north to Cardwell in the south, it is one of the few places in the world where two World Heritage Areas meet: the Wet Tropics and the Great Barrier Reef.

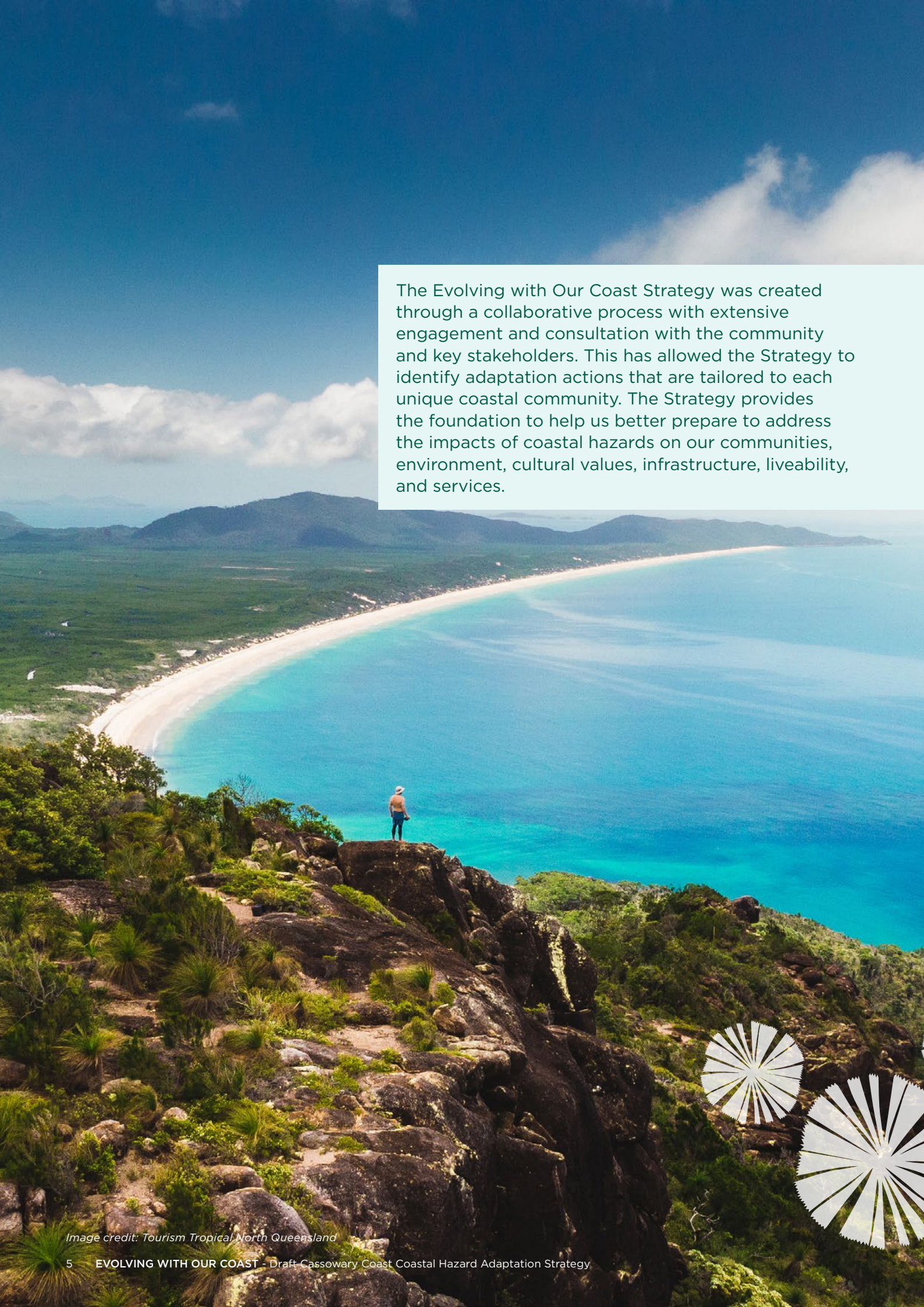
Access to the coast and the reef has shaped the way of life for our community. Our picturesque coastline is home to a number of small to medium sized settlements fronting stunning beaches and boasting iconic coastal views, lush tropical rainforests and access to the reef. Inland, the beach ridge plains and rich volcanic soils also support important agricultural areas used for sugar cane and banana farming.



Our coastline and community are vulnerable to changes in coastal hazards and the long-term impacts of climate change including:

- coastal erosion (including from cyclones);
- storm tide inundation; and
- sea-level rise.

We already live with natural hazards and understand the potential devastating impacts, with many current residents having experienced severe flooding of the Johnstone and Murray Rivers, and the direct impacts of tropical cyclones Larry (2006) and Yasi (2011). While changes to our coastline are natural and inevitable, climate change is expected to worsen the impacts of natural hazards in our region. To better prepare, mitigate and protect our region and community against these hazards, the Queensland Government launched the QCoast2100 program, a State-wide initiative that provides councils with funding, tools and technical support to develop coastal hazard adaptation strategies (CHAS). Cassowary Coast Regional Council (Council) successfully obtained funding under the QCoast2100 program to develop a CHAS for coastal settlements within our local government area.

An aerial photograph of a tropical coastline. In the foreground, a person wearing a hat and shorts stands on a dark, rocky cliffside, looking out over the ocean. The cliffside is covered in lush green vegetation, including palm trees and other tropical plants. The ocean is a vibrant turquoise color, transitioning to a deeper blue further out. A long, sandy beach curves along the coast, bordered by a dense line of green trees. In the background, there are rolling hills and mountains under a clear blue sky with a few wispy clouds. A white text box is overlaid on the right side of the image, containing text about the 'Evolving with Our Coast Strategy'.

The Evolving with Our Coast Strategy was created through a collaborative process with extensive engagement and consultation with the community and key stakeholders. This has allowed the Strategy to identify adaptation actions that are tailored to each unique coastal community. The Strategy provides the foundation to help us better prepare to address the impacts of coastal hazards on our communities, environment, cultural values, infrastructure, liveability, and services.

PURPOSE OF THE STRATEGY

To date, the management of coastal hazards has been largely undertaken in response to a particular event or impact rather than as part of a broad, holistic and proactive approach. Council is taking the initiative to strengthen the resilience and preparedness of our communities when it comes to coastal hazards. The Evolving with Our Coast Strategy ('the Strategy') seeks to:

- assess and reduce our current and future exposure to the risk of coastal hazards over the medium to long-term;
- propose tailored adaptation measures to respond to these impacts and establish a plan for implementation;
- strengthen the resilience of our communities to coastal hazards;
- mitigate coastal hazard risks while supporting a sustainable and prosperous economy; and
- protect the unique coastal environment and lifestyle of our communities.

The Strategy was created through a collaborative process with extensive engagement and consultation with the community and key stakeholders. This has allowed the Strategy to identify adaptation actions that are tailored to each unique coastal community. The Strategy provides the foundation to help us better prepare to address the impacts of coastal hazards on our communities, environment, cultural values, infrastructure, liveability, and services.

CORE OBJECTIVES OF THE STRATEGY

The core objectives of the Strategy are to:

- Improve Council's and the community's understanding of future risks from coastal hazards and how they might change over time as a result of climate change;
- Consult with the community clearly and sensitively throughout key stages of the project so the community understands the implications of coastal hazard adaptation actions and contributes to decision making;
- Identify the actions required to increase resilience to these risks to people, property, assets and the environment;
- Provide mapping and visual products and deliverables that are useful for a range of purposes across Council departments and functions and within the community (e.g. planning scheme, asset management, community awareness, disaster management and financial planning); and
- Provide direction for a coordinated approach for Council and the community to adapt to climate change as it influences coastal hazards.

HOW THE STRATEGY WAS DEVELOPED

The Strategy was developed over eight (8) phases of work which were grouped under three (3) key themes, consistent with the QCoast2100 program's Minimum Standards and Guidelines.



Figure 1. QCoast2100 Phases

Source: Local Government Association Queensland (LGAQ) and Department of Environment and Heritage Protection (DEHP) (2016). QCoast2100 Developing a Coastal Hazard Adaptation Strategy: Minimum Standards and Guidelines for Queensland Local Governments. LAQ and DEHP, QLD.

In the course of developing the strategy we have:

- Identified present climate coastal hazard extents for coastal erosion, storm tide inundation and predicted tides, and how these extents might be expected to change in the future under the influence of climate change over the medium-term (2050) and long-term (2100).
- Assessed vulnerability and risks to a broad range of natural and built assets, considering environmental, social, cultural and economic values.
- Identified priorities – distinguishing between urgent risks that need responding to today and risks that can wait.
- Identified adaptation actions to treat or manage coastal hazard risks.
- Identified 'tools' to deliver the adaptation actions.
- Outlined the timing, staging and sequencing of actions over time.
- Defined roles and responsibilities for implementing actions.
- Identified potential funding sources.
- Outlined monitoring and review expectations.

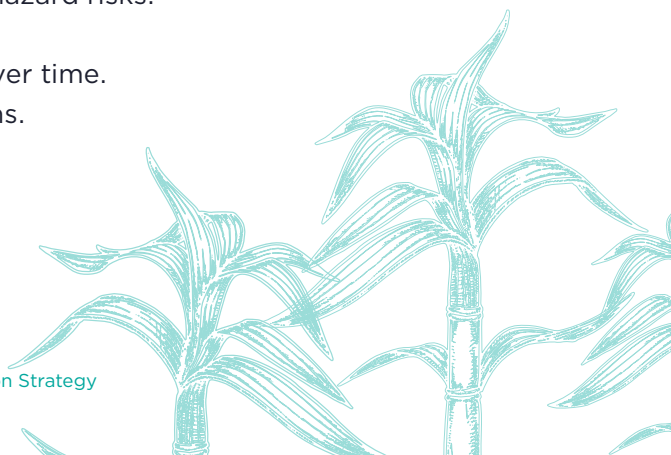




Image credit: Tourism Tropical North Queensland

OUR LIVED EXPERIENCE...

Living with coastal hazards is part of living in the Cassowary Coast. We are a resilient community, most of us have grown up experiencing cyclones and other severe weather events as a part of life.



In the early hours of the morning on 3 February 2011, severe tropical cyclone Yasi (Yasi) crossed the coast near Mission Beach. The largest and most intense cyclone to hit North Queensland since 1918, and with an eye approximately 30 kilometres wide, the Category 5 cyclone had a devastating impact on coastal communities directly in its path, including Tully, Mission Beach, Cardwell and Dunk Island.

Yasi caused an estimated \$800 million in damages to property and infrastructure with wind gusts of up to 285 kilometres per hour recorded and sustained wind speeds of up to 185 kilometres per hour. These winds generated high-energy wave conditions, causing erosion along the coastline from Cairns to Townsville¹. A peak storm surge of 5.33 metres was recorded at Cardwell during a falling tide, avoiding more serious inundation¹. Had Yasi crossed the coast at high tide, water levels would have been almost 3 metres higher¹. An estimated \$6.8 billion was allocated to recovery and rebuilding efforts, which Council is still responding to¹.

Five years prior, on the morning of 20 March 2006 tropical cyclone Larry (Larry) crossed the Queensland coast near Innisfail. Larry caused extensive damage to infrastructure and crops, particularly banana crops around Innisfail, estimated at upwards of \$500 million². Approximately 10,000 houses were damaged and flooding disrupted road and rail access for several days².

Our past experiences provide a foundation for many aspects of our life – from how we maintain our properties, to where we find information about weather events. It also provides an opportunity for us to build on what we already know works well in our region. These past events have resulted in the creation of several disaster response mechanisms such as our Disaster Management Plan and Cyclone Guide. This Strategy seeks to build on this by developing adaptive capacity within Council and across our community and to outline a series of strategic actions that can be implemented over time.

DID YOU KNOW...

In 1918, Mission Beach, Innisfail and surrounds were hit by two of Australia's deadliest recorded cyclones, occurring within less than two months of each other³. There were reports of a 'tidal wave' tracking from Dunk Island into Bingil Bay while Mission Beach was under 3.6m of water⁴. Every structure was reported to have been destroyed by the storm surge in the Bingil Bay and Mission Beach area². Since then, our community has experienced the impacts of numerous severe weather events including flooding of the Johnstone and Murray Rivers⁵.

¹ The State of Queensland (Department of Science, Information Technology, Innovation and the Arts). (2012). Tropical Cyclone Yasi 2011. Retrieved from <https://knowledge.aidr.org.au/media/1767/tc-yasi-post-cyclone-coastal-field-investigation.pdf>

² Bureau of Meteorology. (2006). Severe Tropical Cyclone Larry. Retrieved from <http://www.bom.gov.au/cyclone/history/larry.shtml>

³ Hillier, R. (2018). The deadly cyclone season of 1918. Retrieved from <https://www.slq.qld.gov.au/blog/deadly-cyclone-season-1918>

⁴ Callaghan, J. (2011). Case Study: The Innisfail Cyclone, 1918. Retrieved from https://hardenup.org/umbraco/customContent/media/632_Innisfail_Cyclone_1918.pdf

⁵ Cassowary Coast Regional Council. (2021). Help Shape Our Coast's Future. Retrieved from <https://www.cassowarycoast.qld.gov.au/news/article/558/october-11-2021-help-shape-our-coast-s-future>

WHAT YOU TOLD US

Your feedback has played an integral role in the development of the Evolving with Our Coast Strategy.

We have engaged with community and industry stakeholders, business and tourism groups, Councillors and people young and old to help develop this strategy. This has helped us to understand key features, locations, experiences and values associated with the coast to inform and frame our plan for the future.

Engagement activities included surveys, meetings, workshops and pop-up listening posts. These activities have focused on raising awareness of the Strategy, gaining local knowledge and feedback, and educating on coastal hazard risks and projected impacts.

What we heard...

- The community have a lived experience of coastal hazards and are aware the coastline is always changing.
- There are varying levels of concern about coastal hazards across the different localities – some communities are “very concerned” while others are less worried.
- Foreshore areas are important parts of our communities – particularly as a place to recreate, gather and socialise.
- There is no ‘one size fits all’ approach to adaptation. Each community has different preferences depending on their location, experience and values.
- Across the broader community, restoring and enhancing vegetation was the adaptation response with the greatest level of community support.
- If hard engineering options like seawalls are used, they need to be designed to maintain public beach access and complement the unique coastal character of the place.
- The community is generally eager to be involved in responding to coastal hazards and adaptation – particularly in monitoring coastal changes and helping to plant vegetation.

HOW WE ENGAGED:



**COUNCIL
WEBPAGE WITH
439 VIEWS**



**POP-UPS WITH
APPROXIMATELY
100 PEOPLE
DIRECTLY
ENGAGED**



**SOCIAL MEDIA
ENGAGING 618
PEOPLE**



**ONLINE SURVEY
WITH 144 SURVEY
RESPONSES**



**SCHOOL
WORKSHOP WITH
APPROXIMATELY
60 STUDENTS**



**STAKEHOLDER
MEETINGS WITH 7
GROUPS**





OUR COASTAL VALUES

OUR COASTAL PLACES

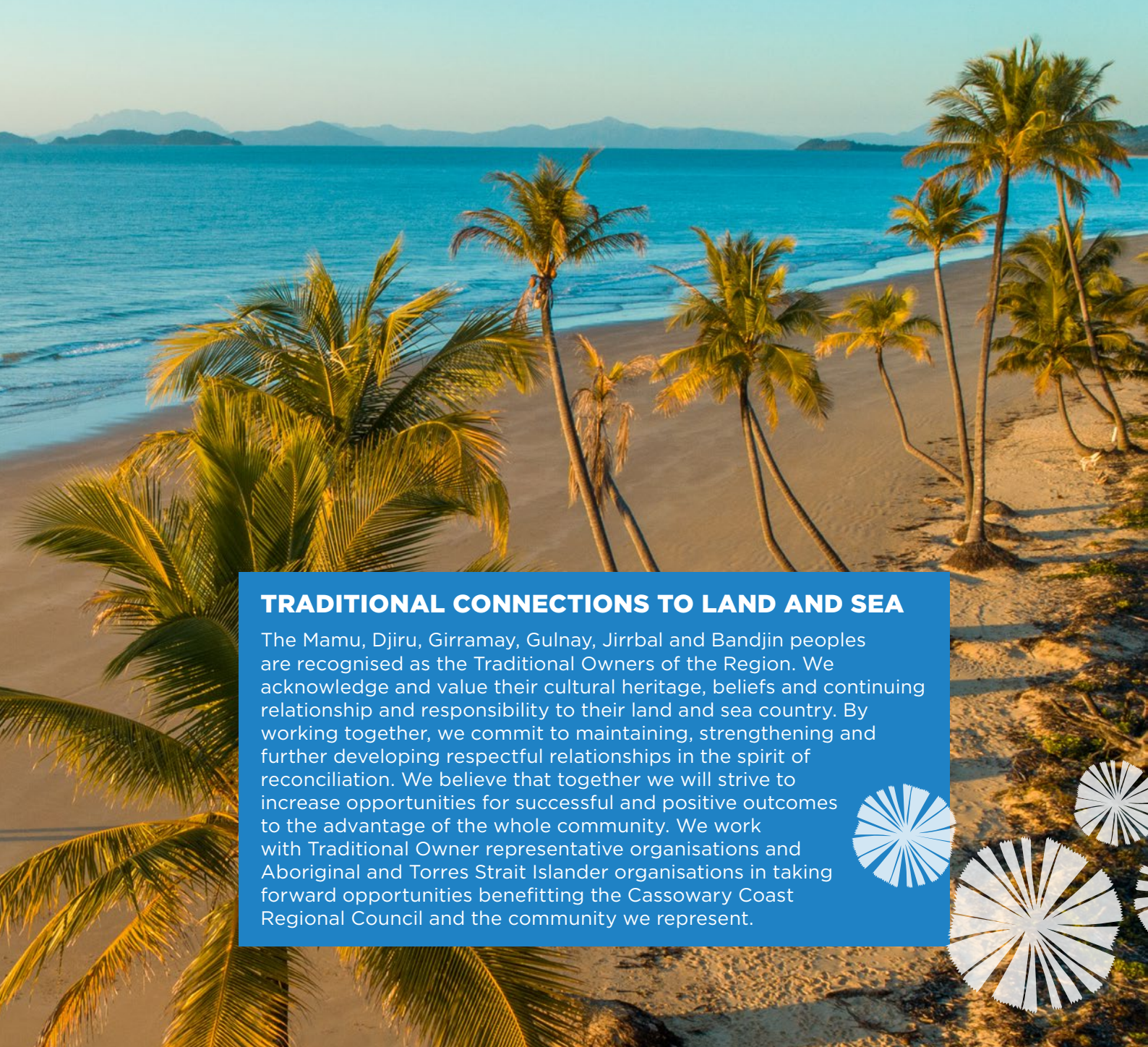
Situated midway between Cairns and Townsville and home to two World Heritage Areas, the Cassowary Coast region covers 120 kilometres of stunning coastline, stretching from Innisfail in the north to Cardwell in the south.

The region is well-known for its lush tropical rainforests, idyllic beaches and rich agricultural land, making the Cassowary Coast the biggest banana-growing region in Australia. The region boasts the closest access point to the Great Barrier Reef, one of the seven wonders of the natural world, valued at \$56 billion with \$29 billion directly attributed to tourism. The region's pristine natural environment has shaped our community's way of life. Our unique coastline plays an important role in supporting our local and regional economy, both directly by attracting tourism spending, and indirectly, by attracting people and businesses to our region⁶. There are over 3,000 local businesses operating in the region, employing nearly 14,000 residents⁶.

The region is home to approximately 29,000 people with the main coastal population centres being Innisfail on the Johnstone River in the north, Cardwell on the south coast and the broader Mission Beach area.

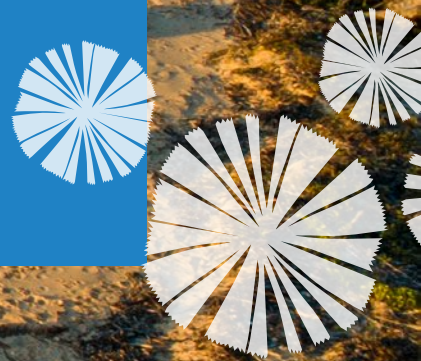
Less than 90 kilometres by road to Cairns Airport, a major international entry point to tropical northern Australia, Innisfail is the region's biggest town and major service hub comprising a range of shops, government services, and health and education facilities. The Innisfail coastal area includes the town of Innisfail and the small coastal localities of the Coconuts, Flying Fish Point and Coquette Point.

⁶ *Tropical Coast Tourism. (2019). Cassowary Coast Region Tourism Strategy. Retrieved from: <https://www.cassowarycoast.qld.gov.au/cassowary-coast-tourism-strategy-1/cassowary-coast-tourism-strategy>*



TRADITIONAL CONNECTIONS TO LAND AND SEA

The Mamu, Djiru, Girramay, Gulnay, Jirrbal and Bandjin peoples are recognised as the Traditional Owners of the Region. We acknowledge and value their cultural heritage, beliefs and continuing relationship and responsibility to their land and sea country. By working together, we commit to maintaining, strengthening and further developing respectful relationships in the spirit of reconciliation. We believe that together we will strive to increase opportunities for successful and positive outcomes to the advantage of the whole community. We work with Traditional Owner representative organisations and Aboriginal and Torres Strait Islander organisations in taking forward opportunities benefitting the Cassowary Coast Regional Council and the community we represent.



The Mission Beach area is a key regional gateway to the Great Barrier Reef, as well as the Family Islands, including Dunk Island, a 1,000 hectare island located 4 kilometres offshore of South Mission Beach. Dunk Island is home to popular council-run camping facilities, a former resort site that was severely damaged by tropical cyclone Yasi in 2011 and national park. The Mission Beach coastal area includes the localities of South Mission Beach, Wongaling Beach and Mission Beach – all connected by a palm-fringed beach that is reportedly the longest continuous stretch of sand in Far North Queensland. Mission Beach is a vibrant tropical tourist town and home to one of the highest concentrations of the endangered Cassowary in Australia. It contains homes, tourist facilities, businesses, a visitor centre, camping ground and an important regional boat ramp at Clump Point.

In the south, the Cardwell coastal area covers the seaside town of Cardwell and neighbouring Port Hinchinbrook. Cardwell is the northern gateway to 37-kilometre-long Hinchinbrook Island and adjacent Hinchinbrook Channel, with some of the best fishing and boating in Australia. Cardwell is located on the National Highway providing easy access to unexplored rainforests, rugged terrain, numerous waterfalls, steep gorges and unlimited waterways. About one kilometre south of Cardwell, Port Hinchinbrook is situated at the mouth of Stoney Creek. It incorporates a residential canal estate and marina.



Figure 2. Cassowary Coast Region



Images credit: Tourism Tropical North Queensland

OUR COASTAL LIFESTYLE

Our coastline is characterised by soft sandy beaches with clear, calm water. Foreshore areas are important to our communities – particularly as a place to recreate, gather and socialise.

Residents of, and visitors to, our coastal communities value convenient access to clean foreshore areas where they can walk along the beach and enjoy the natural, unspoiled environment, catch up with friends and family and participate in various recreational activities – on land and in the water.

The engagement informing the strategy has helped us understand what our communities currently value on the coast and why these areas are important.

Our favourite ways to enjoy our coastal places include:

- Enjoying scenic views and experiencing the natural environment
- Recreational activities along the foreshore (e.g. walking, cycling, using the playgrounds)
- Visit cafes, restaurants and shops
- Social events with friends / family (e.g. BBQ, picnics)

The most important features of our communities to protect include:

- The natural environment including the beach, foreshore area and mangroves
- Recreational amenities (e.g. fishing and picnic areas)
- Character of the area and ‘natural beauty’
- Recreational infrastructure (e.g. walking and bicycle tracks, jetties, boat ramps and playgrounds).





UNDERSTANDING OUR CHANGING COAST

Our coastline is dynamic and always changing; it is continuously 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, 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 that we usually use and experience our coast, they are referred to as coastal hazards.

The coastal hazards which are the focus of this Strategy are:

- coastal erosion
- storm tide inundation
- sea level rise.

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 to 2100 (with 0.8m sea level rise). Queensland's State Planning Policy 2017 requires all Councils to adopt a timeframe of the year 2100 to account for climate change impacts in its strategic land use planning. The policy adopts a scenario of the Queensland coastline experiencing a 0.8m sea level rise and a 10% increase in cyclone intensity based on the recommendations from the Intergovernmental Panel on Climate Change (IPCC).

WHAT ARE COASTAL HAZARDS?

Coastal hazards have the potential to cause dramatic changes permanently or temporarily to our coastline. Originating from the sea, they can occur rapidly during significant storm events such as cyclones or develop over several years in response to long-term natural coastal processes. This Strategy focuses on three coastal hazards affecting our coastline:

1

STORM TIDE INUNDATION:

The temporary flooding of low-lying land which occurs during high tides combined with prolonged strong winds, storms and cyclones. It can result in wave overtopping of foreshores along the open coastline or inundation of land adjacent to waterways, estuaries and stormwater systems connected to the ocean.

Note: Storm tide - mapped in this Strategy refers to the 1% Annual Exceedance Probability (AEP) event. This is equivalent to an event large enough that it could be statistically expected to occur once every 100 years. These events can occur in clusters.



2

PERMANENT INUNDATION DUE TO SEA LEVEL RISE:

Regular, permanent inundation from the tidal cycle, including up to the level of the highest astronomical tide. Sea level rise also increases the extent of land vulnerable to coastal erosion and storm tide inundation. A 0.8m increase to the sea level by 2100 is currently required to be planned for by the Queensland State Government.



3

COASTAL EROSION:

The temporary or permanent loss of land, beaches or dunes by wave or wind action, tidal currents, water flows or tidal inundation. Coastal erosion can occur rapidly when associated with a storm event, or slowly over a period of months or years due to changes in the local natural sediment supply.



DEFINING RISK

A key concept underpinning this strategy is 'risk'. Risks from coastal hazards can be direct (e.g. inundation of a road) or indirect (e.g. inundation which isolates a community). Risk can be to the safety of people, the natural environment, buildings, public infrastructure, private property, community facilities, places of social and cultural importance or to our lifestyle and economic prosperity.

To ensure we can adapt and respond to coastal hazards effectively and efficiently, it is important we plan for the varying level of risks posed by coastal hazards in our community. The identification of risk is based on an understanding of the likelihood and consequence of coastal hazards.

Risks have been assessed for assets exposed to erosion, tides and storm tide inundation impacts for the present climate, 2050 (0.3m sea level rise) and 2100 (0.8m sea level rise) future climates.

1 UNDERSTANDING SOME KEY TERMINOLOGY

HAZARD: A hazard is a source or situation with the potential for harm in terms of human injury, damage to property or a combination of both.

RISK: A risk is the change of something happening that will have a negative effect.

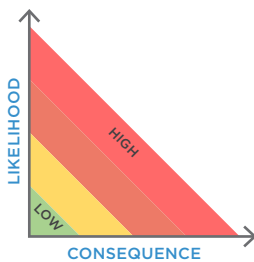


This is what we are planning for as part of our Strategy



Risk helps understand the likelihood and consequence of a negative effect, such as a coastal hazard event taking place

2 DETERMINING RISK



LIKELIHOOD: This considers the probability of the risk eventuating.

CONSEQUENCE: This considers the result of effects from a risk eventuating.

3 MANAGING RISK

Our strategy is just the start!

The Strategy sets out a number of adaptation actions that will ensure our coastal communities continue to be a beautiful and safe place to live and play.

To ensure we are able to manage the risks resulting from coastal hazards, we as a Council will ensure risk based planning is part of all decision making.

DEFINING RISK

Risk = Likelihood of a hazard occurring x consequence of impact if it does occur.

Low

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

ONGOING RISK OF COASTAL HAZARDS

We all have special places, features, qualities, or memories of the coast which are important to us for different reasons – social, environmental, economic, cultural or personal.

These places are at risk when coastal hazards such as erosion, storm tide inundation and permanent inundation due to sea level rise threaten to impact them. Our coastal hazard risk today will be different to our future risk. For example, an area not exposed to coastal hazards today may be exposed in the future, therefore the risk to that area increases over time.

To understand the impact of coastal hazards on our special places and important infrastructure, we have looked at how exposed our different assets and features are to potential coastal hazard impacts over time. This has been undertaken from a social, economic and environmental perspective:



SOCIAL

for example, impacts to the community, services, culture and wellbeing; disruption caused; loss of life or injury; and public attention from coastal hazard impacts.



ECONOMIC

for example, financial impacts to repair damaged properties, infrastructure and business e.g. loss of employment, business and tourism; failure of infrastructure; and recovery costs from coastal hazards.



ENVIRONMENT

for example, impacts to the environment; level of harm and remediation required; length of recovery; potential for containment; and loss of species and habitat from coastal hazards.



Image credit: Tourism Tropical North Queensland



IDENTIFYING AREAS AND ASSETS AT RISK FROM COASTAL HAZARDS

The risks to our coastal communities from coastal hazards are expected to increase over time. Some of our coastal communities are already vulnerable to coastal erosion and storm tide inundation, however, may become even more exposed in the future.

To understand the extent of potential impacts of coastal hazards to land and infrastructure in the Cassowary Coast Region today and into the future, a technical analysis was undertaken of:

- Council asset databases to identify Council owned and managed infrastructure – e.g. buildings, roads, water supply, foreshore park or boating infrastructure, natural areas/conservation parks;
- The Cassowary Coast Planning Scheme 2015 land use zoning;
- Asset data from external infrastructure providers, including State agencies.

As sea levels rise, the risk of exposure to coastal hazards is expected to intensify and become more widespread in some areas. Coastal hazard extent and risk mapping has been prepared for each coastal settlement area for three (3) timeframes:

SHORT-TERM	MEDIUM-TERM	LONG-TERM
Present climate coastal hazards	Coastal hazards around 2050 (0.3m sea level rise) future climate	Coastal hazards around 2100 (0.8m sea level rise) future climate

This mapping indicates how coastal hazard extents and risks may change over time under the influence of climate change. The mapping helps us:

- understand where to focus effort on monitoring impacts and changes over time;
- prepare for change; and
- make informed decision about growth, development and investment on our coast.

You can access coastal hazard mapping via Council’s website. It is intended that new coastal hazard mapping will be prepared as climate science and policy updates become available.

WHAT MIGHT BE IMPACTED IN THE FUTURE?

Coastal hazards have the potential to impact different places and infrastructure over time, By the 2100 future climate, more than 1000 buildings throughout the Cassowary Coast region may be exposed to storm tide and erosion hazards including:

- Innisfail Sewage Treatment Plant
- Parts of the Bruce Highway
- Parts of the North Coast rail line
- Popular beachfront areas at Mission Beach, ETTY Bay and Dunk Island
- Public and private waterfront properties near Cardwell, Mission Beach and Flying Fish Point
- Council infrastructure including stormwater networks, toilet blocks, swimming pools and information centres)
- Important community-led facilities including surf lifesaving clubs at Mission Beach and ETTY Bay, and Volunteer Coast Guard services



RESIDENTIAL

761 LAND PARCELS AFFECTED BY STORM TIDE INUNDATION BY PRESENT CLIMATE

1,872 LAND PARCELS AFFECTED BY 2100 FROM STORM TIDE INUNDATION



BUSINESS

14 LOCAL BUSINESSES VULNERABLE TO EROSION BY 2100

16 LOCAL BUSINESS PARCELS AFFECTED BY STORM TIDE INUNDATION BY 2100



INDUSTRIAL

52 LAND PARCELS VULNERABLE TO EROSION BY 2100

50 LAND PARCELS AFFECTED BY STORM TIDE INUNDATION BY 2100



COMMUNITY

21 LAND PARCELS EXPOSED TO EROSION BY 2100

23 LAND PARCELS AFFECTED BY STORM TIDE INUNDATION BY 2100



STATE-CONTROLLED ROADS

6.5KM OF STATE-CONTROLLED ROAD EXPOSED TO EROSION BY 2050

7.7KM OF STATE-CONTROLLED ROAD AFFECTED BY STORM TIDE INUNDATION BY 2100



LOCAL HERITAGE PLACES

8 EXPOSED TO EROSION BY 2050

9 AFFECTED BY STORM TIDE INUNDATION BY 2100



UTILITIES

30.4KM OF WATER MAINS EXPOSED TO EROSION BY 2050

62KM OF HIGH VOLTAGE ELECTRICITY AFFECTED BY STORM TIDE INUNDATION BY 2100



OUR ROLE IN ADAPTATION

Image credit: Tourism Tropical North Queensland

The management of coastal hazards and risk is a shared responsibility between Council, other land managers and private landowners. Council plays a key role by appropriately locating, designing, constructing, managing and maintaining public assets. Council also has a legislative responsibility to support community resilience to natural disasters and climate change through land use planning and disaster management.

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 AND ASSET TYPE		
		Council owned and managed (e.g. community land, parks and facilities)	Public land and assets managed by others (e.g. Bruce Highway)	Private assets such as homes and businesses
COUNCIL'S ROLE	INFORM	✓	✓	✓
	OBSERVE	✓	✗	✗
	PLAN	✓	✗	✗
	ACT	✓		

INFORM	<ul style="list-style-type: none"> Ensuring areas of coastal hazards are appropriately mapped in the Cassowary Coast Regional Council Planning Scheme so that the community are properly informed when it comes to development. <p>Note - updated mapping has been prepared for the Strategy</p> <ul style="list-style-type: none"> Council provides information about coastal hazards through the Disaster Dashboard, an online and interactive mapping tool used for disaster management planning.
OBSERVE	<ul style="list-style-type: none"> Council undertakes regular monitoring of the Cassowary Coast shoreline to understand changes to shoreline position and coastal condition as well as to inform the need for coastal protection works. Monitoring Council owned and managed assets affected by coastal hazards as part of maintenance programs.
PLAN	<ul style="list-style-type: none"> The Cassowary Coast Regional Council Planning Scheme 2015 outlines how Council plans to manage growth and change, including management of coastal hazard impacts now and into the future.
ACT	<ul style="list-style-type: none"> Council's primary responsibility is in implementing adaptation actions to protect, maintain and manage Council-owned land, buildings, infrastructure and assets.

OUR LEGISLATIVE RESPONSIBILITIES

The protection of the coast and the 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 planning instruments including the Cassowary Coast Regional Council Planning Scheme 2015 and relevant Council local laws.

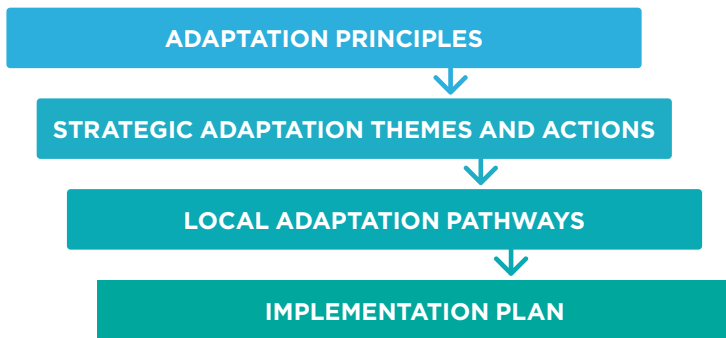


OUR APPROACH TO A RESILIENT COAST

Image credit: Tourism Tropical North Queensland

Adaptation principles, region-wide strategic adaptation actions and local adaptation pathways will guide how our community continues to live with a changing coast and adapts to the challenges presented by coastal hazards.

Our Strategy is made up of:

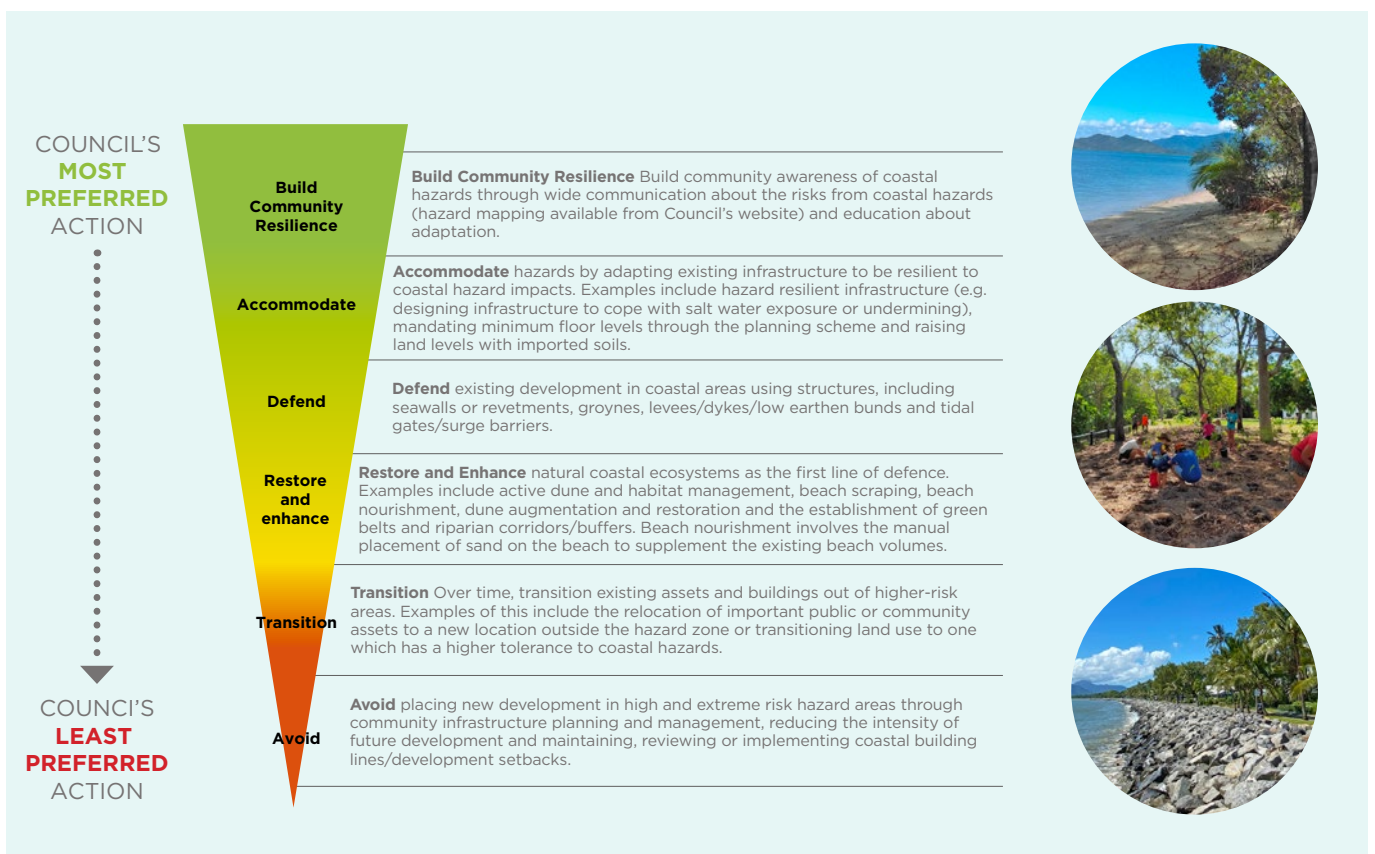


OUR ADAPTATION HIERARCHY

There are many different adaptation actions we can implement to respond to coastal hazards, ranging from revegetation, to engineering solutions like seawalls, right through to relocating buildings and assets. Council already undertakes some of these approaches which will be familiar to the community.

To decide which adaptation action(s) work best at any particular time and place, we refer to the ‘adaptation hierarchy’, which provides guidance on the priority of adaptation responses. The hierarchy of adaptation actions recognises that coastal hazards are unavoidable on the Cassowary Coast. The hierarchy favours building community resilience and accommodating actions as a critical approach in adapting to coastal hazards, particularly for those we are already living with.

Preferred actions are those that will be prioritised in the short term, with less preferred actions implemented when they become necessary.



OUR ADAPTATION PRINCIPLES

Adaptation principles provide a foundation for considering the suitability of different adaptation approaches are to be used to guide consistent decision-making in the implementation of this strategy over time.







Our key adaptation principles are:

- 1 We acknowledge that best practice adaptation may cost more initially but is preferred if it delivers the best outcomes in the long run.
- 2 Each community is unique with its own identity, and adaptation responses seek to respond to risks at each community in their own special way.
- 3 Adaptation responses seek to fit in with 'place', are visually pleasing and achieve multiple public benefits.
- 4 We promote community awareness and ownership of risk, partnerships and collective implementation action by involving stakeholders, business, residents and the community.
- 5 Where practicable, adaptation responses seek to protect and restore natural coastal processes, ecological processes and wildlife habitats.
- 6 Natural and 'soft' responses are prioritised over hard engineering where possible.
- 7 Public funding of responses is focused on benefits to the broader community and public asset protection over private benefit.
- 8 Adaptation works are prioritised in higher risk areas to keep people safe.
- 9 New development must be designed and located to provide maximum protection to people and property against coastal hazards.
- 10 Investing in long design life or costly public infrastructure in higher risk areas is not preferred, and we seek to transition our priority public assets out of higher risk areas where the opportunity arises.

OUR SUITE OF ADAPTATION ACTIONS

Adaptation actions are solutions recommended to mitigate the impacts of coastal hazards. There are many adaptation actions available to respond to coastal hazards in the Cassowary Coast region ranging from planning or ecological approaches, to soft responses such as beach nourishment to 'hard' engineering solutions including seawalls and groynes.

This strategy has considered six (6) themes of adaptation. Each theme contains specific adaptation actions that can be applied to the whole of a region or a locality. Regional actions are intended to be implemented over the lifetime of the Strategy and will be fundamental to underpin the implementation of all adaptation responses at region-wide and local levels.

THEMES OF ADAPTATION	EXAMPLE OF ADAPTATION ACTIONS
 <p>1. BUILD COMMUNITY RESILIENCE through education and community awareness measures.</p>	<ul style="list-style-type: none"> • Community education and consultation • Monitoring • Emergency management response • Geotechnical investigation and detailed, site specific erosion studies
 <p>2. ACCOMMODATE hazards by adapting existing infrastructure to be resilient to coastal hazard impacts – build things 'higher and stronger', evacuation planning etc.</p>	<ul style="list-style-type: none"> • Allow foreshore recession • Hazard resilient design for new/upgraded infrastructure • Emergency management planning and development (e.g. alternative route provision)
 <p>3. DEFEND existing development in coastal areas using hard structures.</p>	<ul style="list-style-type: none"> • Seawalls and scour protection structures • Groynes and artificial headlands • Tidal gates/surge barriers • Levees/dykes/low earthen bunds
 <p>4. RESTORE AND ENHANCE natural coastal ecosystems as the first line of defence.</p>	<ul style="list-style-type: none"> • Active dune and habitat management including vegetation planting • Establish and develop buffers/green belts around wetlands, waterways and estuaries • Beach nourishment • Dune restoration/augmentation/reinstatement • Freshwater and saltwater wetland restoration
 <p>5. TRANSITION over time, existing assets and buildings out of higher-risk areas.</p>	<ul style="list-style-type: none"> • Accept risks (no change to present management approach) • Relocate important infrastructure • Land buy back or swap • Trigger related development approvals
 <p>6. AVOID placing new development in hazard areas and extreme risk hazard areas.</p>	<ul style="list-style-type: none"> • Raise land levels • Reduce intensity of future development • Coastal building lines or development setbacks



REGION-WIDE ACTIONS








STRATEGIC ADAPTATION THEMES AND ACTIONS

There is one adaptation theme that applies to the whole Cassowary Coast Region: *building community resilience*.

Building community resilience, as part of an adaptation plan for coastal regions, is an important action relevant to all populated coastal areas. Continual education, capacity building of and consultation with the community is vital to enable and support the community to develop an understanding of the types of hazards affecting their local areas and the associated levels and acceptability of risk over time. Monitoring programs are also essential to inform decisions surrounding the timing of implementation of any adaptation actions.

The following region-wide strategic actions are to be undertaken over time to build community resilience.

REGION-WIDE STRATEGIC ADAPTATION ACTIONS

Strategic Adaptation Theme	Strategic Adaptation Actions	Timing	
 BUILDING COMMUNITY RESILIENCE	 Community education and consultation	<ul style="list-style-type: none"> Identify existing and new networks to promote knowledge sharing and understanding of coastal hazard risks and adaptation. Prepare educational material (e.g. fact sheets and information kits) Facilitate resident and community awareness on the value of dunes and coastal vegetation and their role in dune management and protection. Establish and strengthen partnerships with Traditional Owners to support and implement adaptation actions. Identify stakeholders and residents likely to be directly impacted. 	Ongoing
	 Monitoring	Seek State and Federal Government funding to: <ul style="list-style-type: none"> Establish a photo monitoring program (CoastSnap or similar) across the coast, prioritising key sites and localities. Establish a beach monitoring program. Undertake an internal audit and establish a register to monitor the frequency and location of beach scraping works. Prioritise monitoring for key locations. 	Ongoing
	 Emergency response	<ul style="list-style-type: none"> Review and update local disaster management plan Review and update emergency response Monitor frequency and nature of emergency management responses and call outs. 	Short-medium term
	 Hazard avoidance for new and replacement community infrastructure	<ul style="list-style-type: none"> Replace 'end-of-life' infrastructure with hazard resilient infrastructure Avoid development occurring in high risk hazard areas. 	Ongoing
	 General land use planning mechanisms	<ul style="list-style-type: none"> Review planning scheme to consider implications of the coastal hazard risk assessment outcomes and to reflect the direction and outcomes of the Strategy. Council to consider 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. Integrate coastal hazard risk considerations into all strategic planning processes for future communities and master plan and structure plan areas. 	Ongoing
	 Targeted geotechnical investigations	<ul style="list-style-type: none"> Identify potential sources for nourishment materials or inform more detailed, site specific erosion studies. 	Ongoing

LOCAL ADAPTATION PATHWAYS

Each locality is different and requires unique adaptation actions to respond to and support key community values and address its particular risk profile over time.

Local adaptation pathways have been developed through a multi-criteria assessment, engagement with key stakeholders and asset owners and have considered the outcomes of community engagement. They provide a sequenced approach to the implementation of preferred adaptation actions.

This approach accounts for the uncertain nature of coastal hazards and allows for the efficient allocation of finances and resources. It is expected that the actions or preferences may change over time as new information comes to hand or impacts are realised. This will need to be considered as part of future reviews of this strategy and ongoing community conversations about coastal hazard risks and adaptation responses.

WHAT IS AN ADAPTATION PATHWAY?

An adaptation pathway is a decision supporting timeline for implementing adaptation actions. It is aligned with projected sea level rise and erosion impacts, or triggers. The timing of when these triggers are reached will be determined by on-the-ground monitoring and gathering data on actual coastal hazard impacts rather than set years. Planning and implementation of particular adaptation actions will commence when these triggers are being approached or reached.

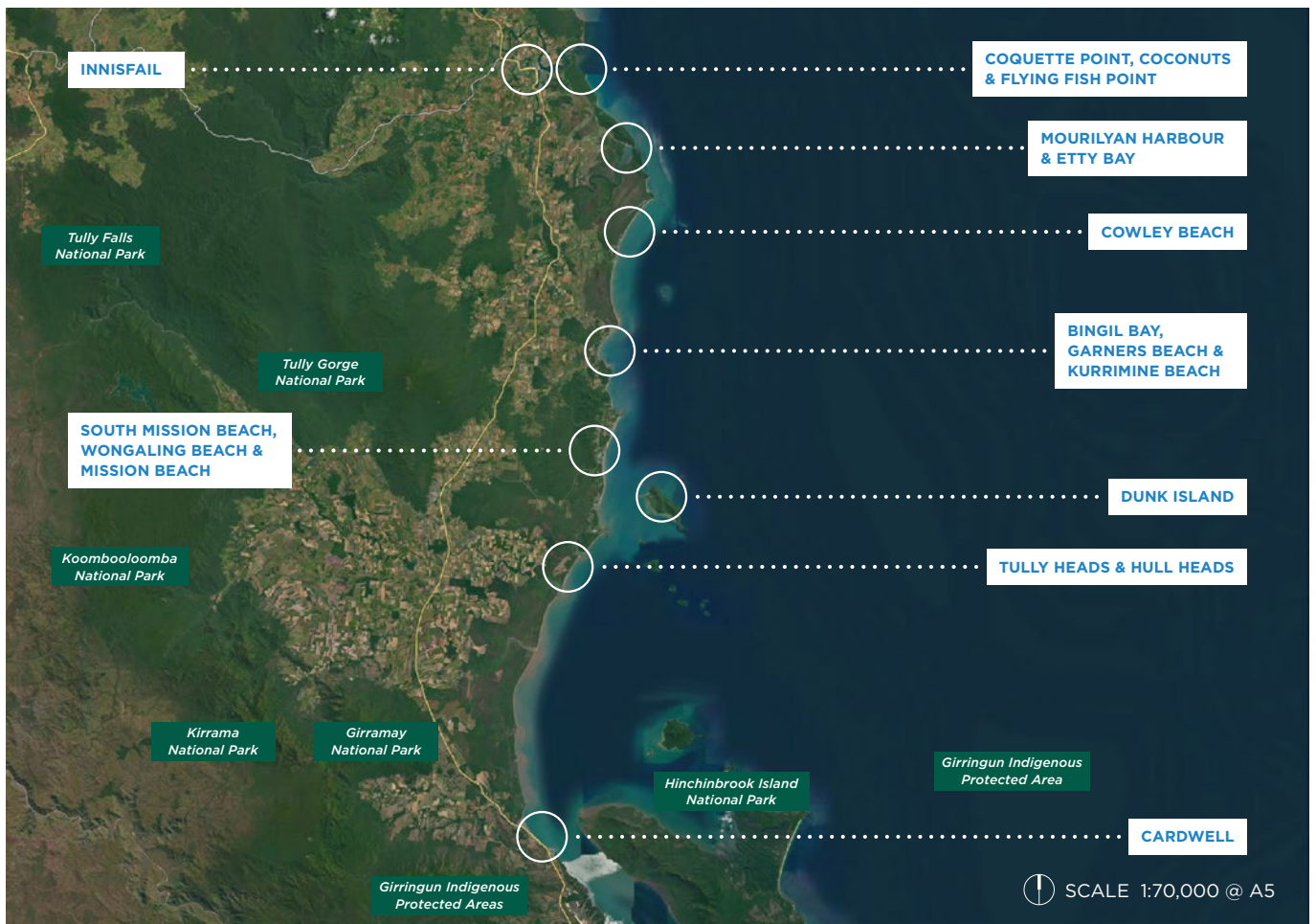


Figure 3. Cassowary Coast Adaptation Pathway Localities



CARDWELL

THE CARDWELL COASTAL AREA

Fronting the northern end of the Hinchinbrook Channel, Cardwell is an important regional centre for the Cassowary Coast, with a range of tourist, retail and commercial facilities. Close to the coastline, the Bruce Highway provides residents, tourists and passers-by with iconic, stunning views across Hinchinbrook Channel to Hinchinbrook Island, making Cardwell the northern gateway to the island along with being a very popular place for travellers to stop and rest. Port Hinchinbrook is situated at the mouth of Stoney Creek, about one kilometre south of Cardwell. It incorporates a private residential canal estate, resort and marina.

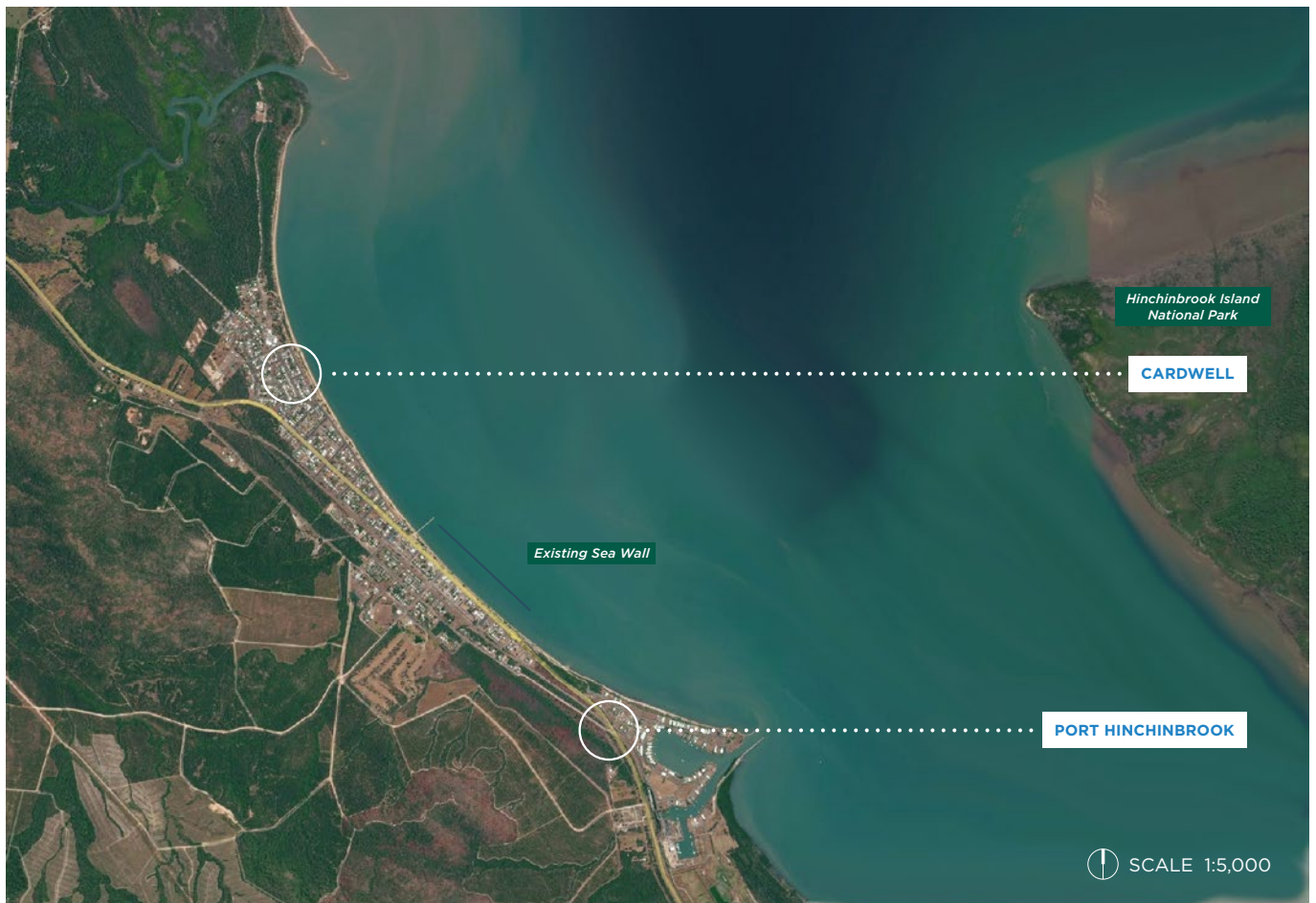


Figure 4. Cardwell Locality

OUR VULNERABILITIES AND RISKS

Cardwell is exposed to erosion, sea level rise and storm tide hazards, now and in the future, given its proximity to the coast. However, erosion is the main hazard affecting the settlement area, with waterfront parklands, recreational and tourism areas, important roads, water supply assets and residential, business and tourism land at risk. Waterfront properties in Port Hinchinbrook are especially vulnerable, being heavily exposed to all hazards.

Seawalls were constructed south of Cardwell's jetty to protect the settlement area from erosion as a result of the direct and devastating impacts of Tropical Cyclone Yasi. Despite the construction of these seawalls, many assets in the town are still at risk under the present and future climate.

WHAT'S IMPORTANT TO OUR COMMUNITY?

The coast supports a range of activities we love and value, including foreshore-based recreation such as walking and cycling, and social events with family and friends. Based on your feedback, the key community values for this area and the most important features to protect are:

- Scenery and natural coastal environment
- Foreshore area
- Cafes, restaurants and shops.
- Recreational infrastructure such as walking and bicycle tracks, jetties, boat ramps and playgrounds.






Images credit: Tourism Tropical North Queensland

OUR ADAPTATION PATHWAY

Table 1 outlines the adaptation pathway and triggers for Cardwell in response to local coastal hazards and risks over time under a changing climate.

- The adaptation pathway north of the Cardwell jetty focusses on maintenance of the beach and dune system where practicable, and consideration of further protection measures if required. A high-level cost-benefit analysis identified that beach nourishment combined with groynes provided better overall benefit to the community over seawalls in this area.
- South of the jetty, ongoing maintenance of seawalls and future localised works may be required to limit inundation.
- The relocation of the existing waste transfer station to a new site outside of the hazard area may be required in the long term.

Table 1 Cardwell Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development 	●————→	●————→	●————→
PORT HINCHINBROOK	<ul style="list-style-type: none"> • Confirm condition of private seawalls and upgrade as appropriate 	●————→	●————→	●————→
	<ul style="list-style-type: none"> • Raise levels of Bruce Highway and North Coast Rail line at waterway crossings 			●————→
CARDWELL (south of the jetty)	<ul style="list-style-type: none"> • Incorporate low earth bunds into foreshore landscaping behind existing seawall 			●————→
CARDWELL (north of the jetty)	<ul style="list-style-type: none"> • Ongoing active dune and habitat management, with beach scraping on an as-needs basis • Combined beach nourishment and groynes (or other measures) 	●————→	●————→	●————→
CARDWELL WASTE TRANSFER STATION	<ul style="list-style-type: none"> • Relocate facility 		●————→	●————→



TULLY HEADS AND HULL HEADS

TULLY HEADS AND HULL HEADS COASTAL AREA

Positioned between the mouths of the Tully and Hull Rivers and fronted by Googarra Beach, Tully Heads and Hull Heads are two small, mainly residential, beachfront communities. Additional residential and rural residential development is located inland, set back from the beachfront. This larger settlement area includes a caravan park, tavern, and waste transfer station.



Figure 5. Tully Heads and Hull Heads Locality

OUR VULNERABILITIES AND RISKS

Tully Heads and Hull Heads were severely impacted by Tropical Cyclone Yasi (2011), with some residential parcels remaining vacant ten years later. Beachfront properties are at risk from all coastal hazards including erosion, sea level rise and storm tide hazards, now and in the future. The broader area is unsewered and at risk from inundation which would impact the operation of existing septic systems.

Googarra Beach was the subject of a detailed 2009 shoreline erosion management plan (SEMP) which identified that the beach is not suited to broadscale beach nourishment or groynes. Instead, seawalls were identified as the preferred management approach. While small sections of existing seawalls in place along the beach require upgrade to restore their effectiveness in managing erosion, the low crest levels mean that they are unable to mitigate the impacts of storm tide inundation and sea level rise.

WHAT'S IMPORTANT TO OUR COMMUNITY?

Our coastline is used by the community to enjoy the scenery and experience the natural environment first and foremost. It provides a range of foreshore-based recreational activities such as walking and is an important place for our community to gather with friends and family.

Based on your feedback, the key community values for this area and the most important features to protect are:

- Foreshore area
- River mouths
- Cassowary habitat
- Penning Park






OUR ADAPTATION PATHWAY

Table 2 outlines the adaptation pathway and triggers for Tully Heads and Hull Heads in response to local coastal hazards and risks over time under a changing climate.

- Beachfront areas will require ongoing dune and habitat management with beach scraping occurring on an as-needs basis.
- Existing seawalls adjacent to residential areas will require replacement.
- Estuarine areas will require upgrades to existing rock protection and the reinstatement of riparian vegetation along the riverbank.
- Minimum floor levels should be mandated for all new development and hazard resilient infrastructure provided for new or upgraded development.

Table 2 Tully Heads and Hull Heads Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development • Hazard resilient infrastructure for new/ upgraded development 	●————→		
BEACHFRONT AREA	<ul style="list-style-type: none"> • Ongoing active dune and habitat management, with beach scraping on an as-needs basis in front of park areas • Community infrastructure planning and management of park assets • Explore incentives to encourage residents to relocate or rebuild outside of hazard areas 	●————→		
	<ul style="list-style-type: none"> • Upgrade or replace seawalls adjacent to residential areas 	●————→		
ESTUARINE AREAS	<ul style="list-style-type: none"> • Upgrade existing rock protection close to Hull River boat ramps by reinstating riparian vegetation along riverbank • Limit further rural residential subdivision in hazard areas 	●————→		
	<ul style="list-style-type: none"> • Community infrastructure planning and management of waste transfer station site • Rural landowners to progressively explore commercial viability of farmland protection via combined tide gates and levees 	●————→		
	<ul style="list-style-type: none"> • Progressively raise land/road levels - Tully Hull Rd 		●————→	



DUNK ISLAND

DUNK ISLAND COASTAL AREA

Dunk Island is a 1,000-hectare island located 4 kilometres offshore from South Mission Beach. The island forms part of the Family Islands National Park and sits within the Great Barrier Reef World Heritage Area. The island is home to a small, Council-run camping ground, a former resort site that was severely damaged by Tropical Cyclone Yasi, as well as national park assets. The resort site is not currently operational pending redevelopment.

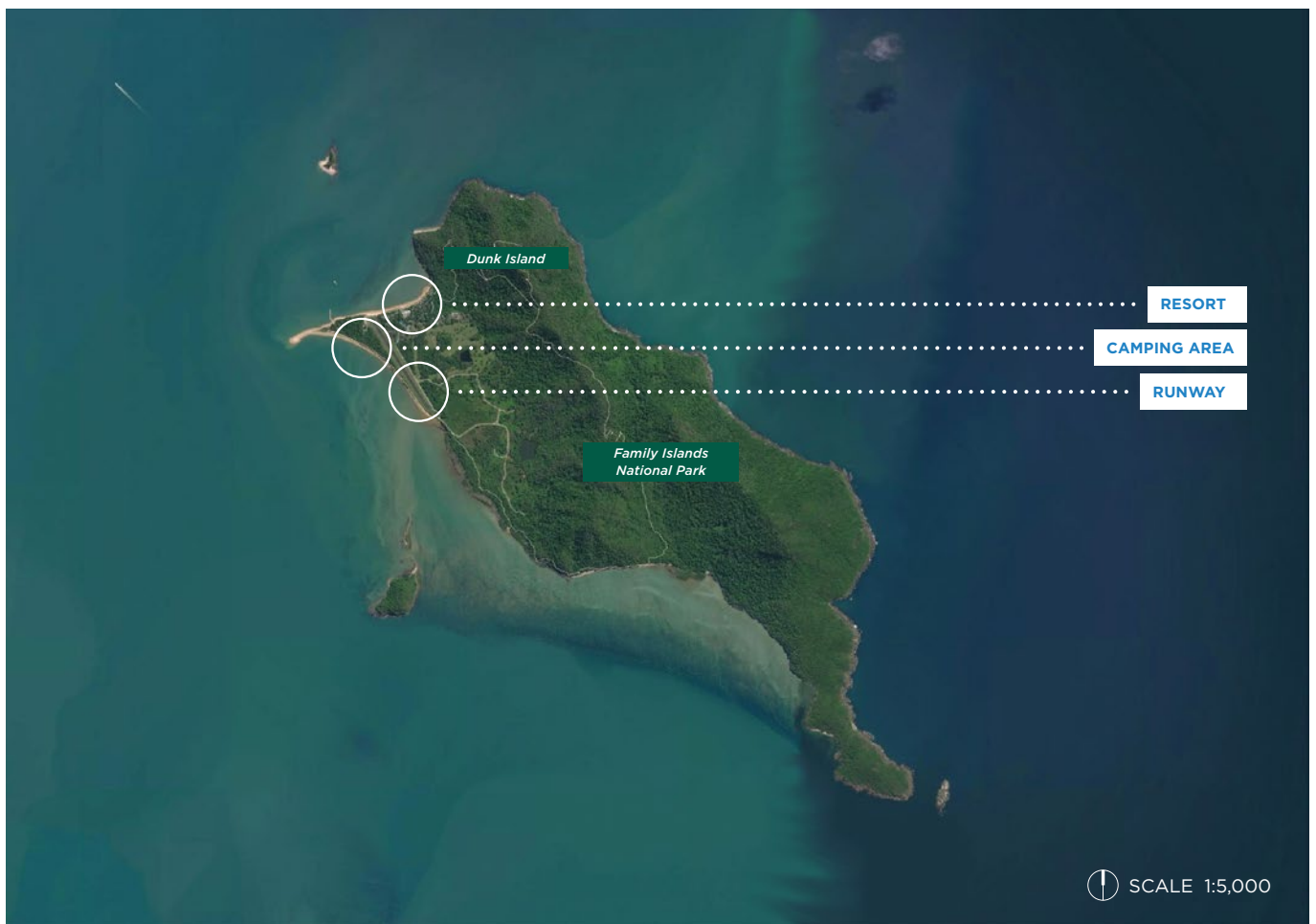


Figure 6. Dunk Island Locality

OUR VULNERABILITIES AND RISKS

Erosion is the predominant risk impacting existing buildings and structures on Dunk Island, particularly the jetty, sewage treatment plant and airport runway. The Dunk Island jetty, which was recently rebuilt following damage incurred during Tropical Cyclone Yasi, has already required active dune and habitat management to protect the jetty abutment from erosion. The resort site is awaiting redevelopment and is at risk from sea level rise under future climates.

WHAT'S IMPORTANT TO OUR COMMUNITY?

Based on your feedback, the key community values for this area and the most important features to protect are:

- Family Islands National Park
- Scenery and natural environment
- Ability to undertake land-based recreational activities.






Images credit: Tourism Tropical North Queensland

OUR ADAPTATION PATHWAY

Table 3 outlines the adaptation pathway and triggers for Dunk Island in response to local coastal hazards and risks over time under a changing climate.

From now, through to the 2100 climate, Dunk Island will require the construction of hazard resilient infrastructure, the mandating of minimum floor levels and ongoing active dune and habitat management. Master planning of the redeveloped resort site will need to consider placing key infrastructure outside of hazard areas where practicable.

Table 3 Dunk Island Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> Hazard resilient infrastructure for new/ upgraded development 	●————→		————→
RESORT AREA	<ul style="list-style-type: none"> Master Plan site to avoid new permanent infrastructure in hazard areas Mandate minimum floor levels for new development Consider need for retention (and subsequent defence) of runway 	●————→	————→	————→
SPIT AREA	<ul style="list-style-type: none"> Ongoing active dune and habitat management Modify landward connection of jetty Localised “as needs” beach nourishment 	●————→	————→	————→

SOUTH MISSION BEACH, WONGALING BEACH AND MISSION BEACH

SOUTH MISSION BEACH, WONGALING BEACH AND MISSION BEACH COASTAL AREA

This coastal area includes the settlements of Mission Beach, South Mission Beach and Wongaling Beach, nestled between the Great Barrier Reef and the iconic wet tropical rainforest of Djiru National Park. South Mission Beach and Wongaling Beach are mainly residential areas, while Mission Beach is a vibrant tourist town, and the area is home to one of the highest concentrations of the endangered Cassowary in Australia. All three communities have a settlement pattern that clusters development close to, and parallel with, the coastline. North of Mission Beach is Clump Point and Narragon Beach.

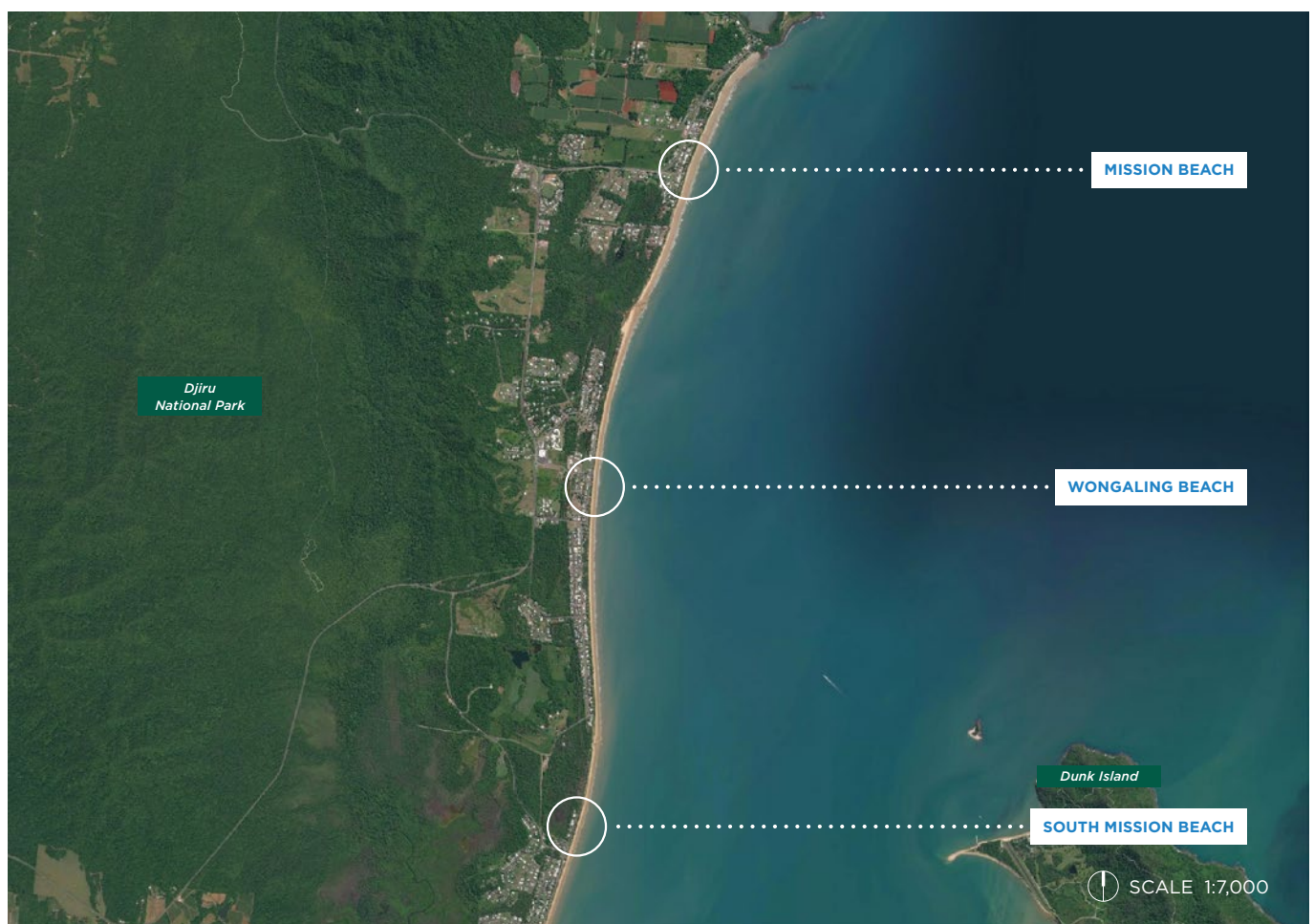


Figure 7. South Mission Beach, Wongaling Beach and Mission Beach Locality

OUR VULNERABILITIES AND RISKS

South Mission Beach is backed by a very narrow and low strip of coastal parkland on the dune and Kennedy Esplanade. The dune vegetation is open and dominated by mowed grasses, used for picnicking and views from adjacent properties. Chronic erosion has resulted in the construction of a rock seawall extending from the boat ramp, north to Jackey Jackey Street to protect Kennedy Esplanade and the narrow foreshore parkland. This seawall was recently upgraded, and periodic nourishment of this area also occurs to reinstate an all-tide beach seaward of the seawall.

At Wongaling and Mission Beaches, there are several areas where private development (mainly residential) directly adjoins coastal dunes with beachfront properties at risk of erosion under the present climate.

This area of coastline is also at risk from permanent inundation via the estuarine waterway networks of the Hull River system, Wheatley Creek and Wongaling Creek. Sea level rise will impact the drainage network and has the potential to exacerbate nuisance flooding of upstream areas.

WHAT'S IMPORTANT TO OUR COMMUNITY?

Residents and visitors to our community use the coast to experience the natural environment and scenery as well as undertake foreshore-based recreational activities, socialise and visit cafes, restaurants and shops. Based on your feedback, the key community values for this area and the most important features to protect are:

- Foreshore
- Beach
- Kennedy walking track
- Boat ramps
- Natural vegetation
- Beach access






Images credit: Tourism Tropical North Queensland

OUR ADAPTATION PATHWAY

Table 4 outlines the adaptation pathway and triggers for South Mission Beach, Wongaling Beach and Mission Beach in response to local coastal hazards and risks over time under a changing climate.

- Minimum floor levels should be mandated for all new development and hazard resilient infrastructure provided for new or upgraded development in all areas.
- Beachfront areas will require ongoing active dune and habitat management and beach nourishment from the present climate through to the 2100 climate.
- More immediate actions for beachfront areas include the establishment of coastal development setbacks on private land south of Mitre Street and exploring opportunities for a permanent sand shifter at South Mission Beach to maintain a consistent supply of natural beach sands to the embayment. A high-level cost-benefit analysis identified that the sand-shifter provided more benefits to the broader community over further seawall construction and the buy-back of private properties.
- Estuarine areas will require raised road levels or localised filling and tidal gates to increase resilience to the 2100 climate impacts.

Table 4 South Mission Beach, Wongaling Beach and Mission Beach Adaptation Pathway

		SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
LOCATION	ADAPTATION ACTIONS			
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development • Hazard resilient infrastructure for new/upgraded development 	●————→		
BEACHFRONT AREA	<ul style="list-style-type: none"> • Ongoing active dune and habitat management, with beach scraping on an as-needs basis • Community infrastructure planning and management of park, road and utility assets • Beach nourishment with localised dune augmentation on an as needs basis 	●————→		
	<ul style="list-style-type: none"> • Establish coastal development setback lines on private land south of Mitre St • Explore opportunities for a permanent sand shifter at South Mission Beach 	●——→		
ESTUARINE AREAS	<ul style="list-style-type: none"> • Community infrastructure planning and management of road upgrades 	●————→		
	<ul style="list-style-type: none"> • Raise road levels or undertake localised filling • Explore efficacy of tidal gates on the tributary of North Hull River • Transition use of South Mission Beach caravan park area affected by tidal inundation 			●——→



BINGIL BAY, GARNERS BEACH AND KURRIMINE BEACH

BINGIL BAY, GARNERS BEACH AND KURRIMINE BEACH COASTAL AREA

This coastal area includes Kurrimine Beach in the north, Garners Beach and Bingil Bay to the south. Bounded by Kurrimine Beach National Park to the north and Maria Creek National Park to the south, Kurrimine Beach is a small beachside community with a service station, popular boat ramp, progress hall and tourist facilities including caravan parks and a motel and many holiday homes. The beach is backed by a narrow coastal reserve which directly adjoins houses and caravan parks.

Situated between two (2) World Heritage Area (Great Barrier Reef Marine Park and the Wet Tropics), Bingil Bay has a small residential settlement with a cafe and camping area.

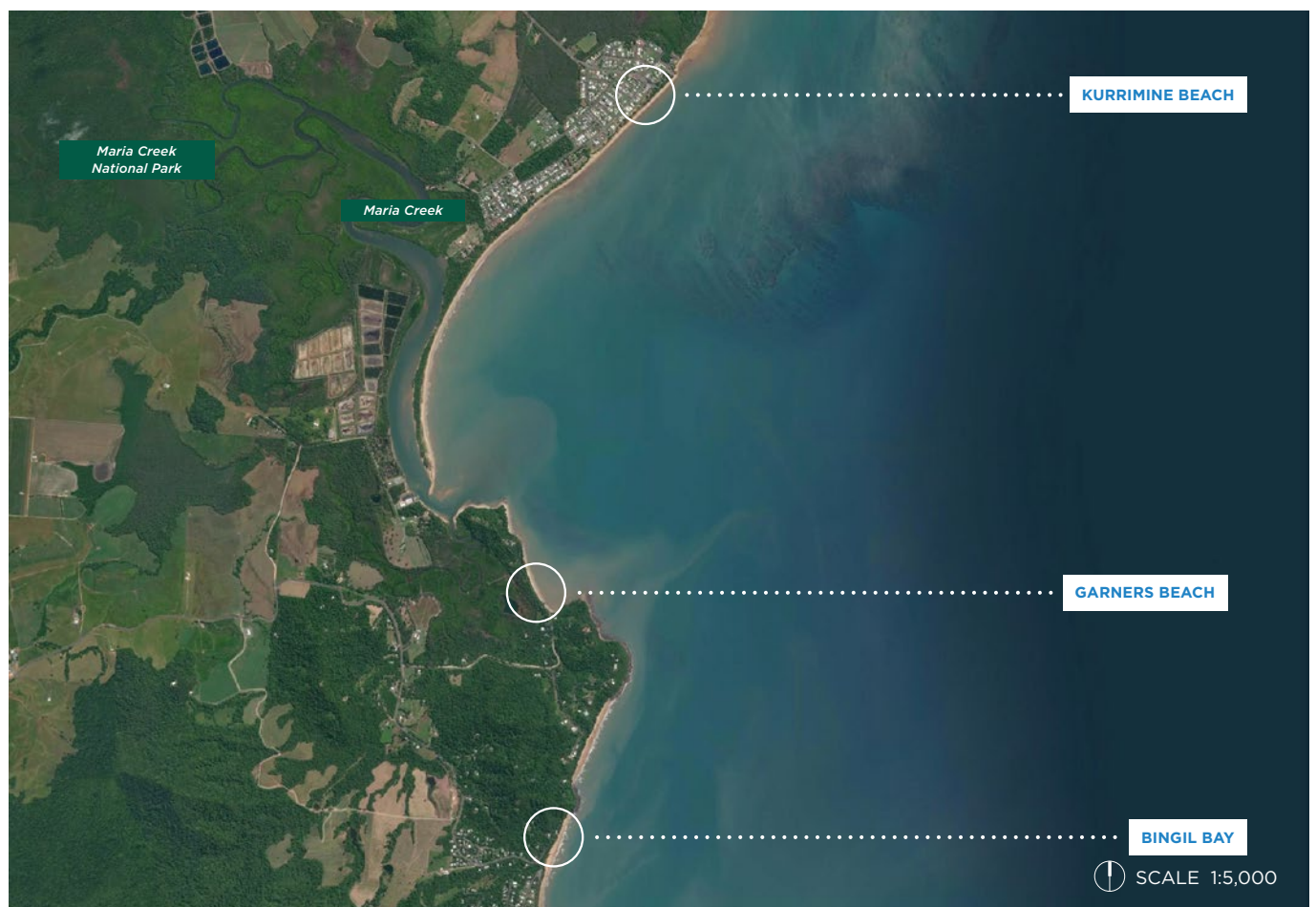


Figure 8. Bingil Bay, Garners Beach and Kurrimine Beach Locality

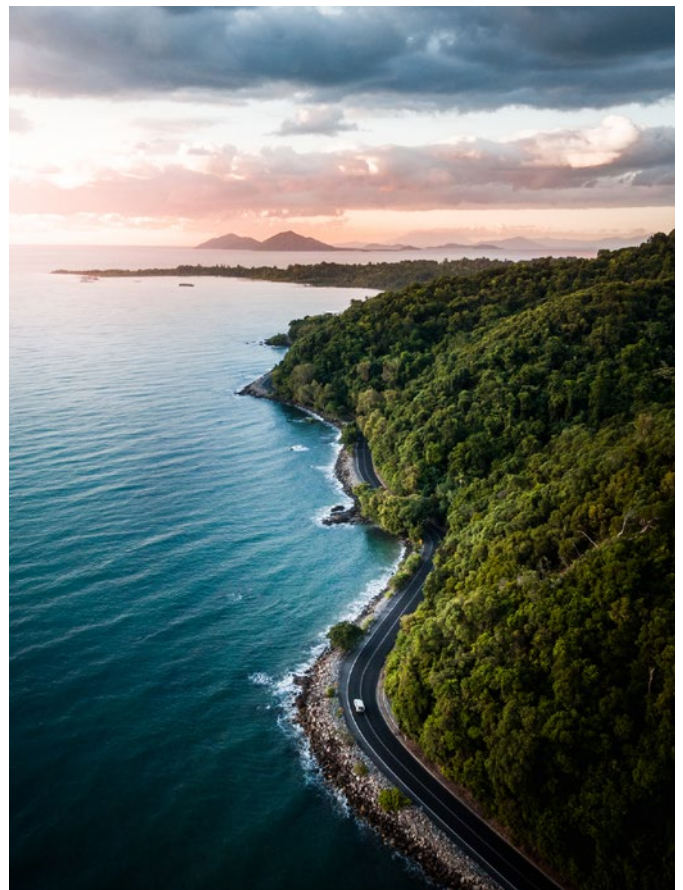
OUR VULNERABILITIES AND RISKS

Under all climates, this broader coastal area is at risk from erosion, particularly Kurrimine Beach. North of the boat ramp, the Council caravan park at Kurrimine Beach is at risk from coastal erosion and from sea level rise via the creek system to the north. The entirety of Maria Creek Estate at the southern end of Kurrimine Beach is exposed to sea level rise by the 2100 future climate. By 2050 sections of the cane railway network and the road access to Kurrimine Beach are at high risk from erosion where they pass close to the bank of estuarine waterways.

Further south, the prawn farms on Maria Creek and the Garners Beach Road crossing of Cedar Creek are at high risk from sea level rise and associated erosion by 2050. At the northern end of Bingil Bay, the small campground is at high risk from erosion under all climates and sea level rise under the 2100 future climate. Alexander Drive, the most direct and popular tourist route between Bingil Bay and Mission Beach, is at risk from erosion under all climates.

WHAT'S IMPORTANT TO OUR COMMUNITY?










Residents and visitors to our community use our coastline as a place to gather, meet with friends and family, experience the natural environment and scenery and enjoy foreshore-based recreational activities. Based on your feedback, our community highly values and wants to protect the natural beauty and character of the area.



OUR ADAPTATION PATHWAY

Table 5 outlines the adaptation pathway and triggers for Bingil Bay, Garners Beach and Kurrimine Beach in response to local coastal hazards and risks over time under a changing climate.

Table 5 Bingil Bay, Garners Beach and Kurrimine Beach Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> Mandate minimum floor levels for new development Hazard resilient infrastructure for new/ upgraded development 			
BINGIL BAY	<ul style="list-style-type: none"> Ongoing active dune and habitat management Progressively transition use of campground area affected by erosion Seawall protection of Alexander Drive 			
GARNERS BEACH ESTUARINE AREA	<ul style="list-style-type: none"> Raise bridge level of Garners Beach Road at Cedar Creek 			
KURRIMINE BEACHFRONT AREA	<ul style="list-style-type: none"> Ongoing active dune and habitat management, with beach scraping on an as-needs basis Community infrastructure planning and management of park, road and utility assets Beach nourishment with localised dune augmentation on an as needs basis 			
	<ul style="list-style-type: none"> Explore use of groynes (or other measures) at northern end of the beach Explore potential seawall alignment and funding arrangements 			
KURRIMINE ESTUARINE AREA	<ul style="list-style-type: none"> Explore opportunities for buy-back or swap of Maria Creek Estate Require consideration of sea level rise in building approvals 			



COWLEY BEACH

COWLEY BEACH COASTAL AREA

Cowley Beach is a small residential community located south of Innisfail between Double Point and Liverpool Creek fronting a 7.5-kilometre-long stretch of unspoilt beach. The Australian Defence Force's Cowley Beach Training Area is located north of the township. Cowley Beach is unsewered and largely surrounded by environmental reserves and rural land parcels. Key community assets include a caravan park and community hall centred around a beachfront boat ramp. Most of the residential area is located north of the boat ramp.

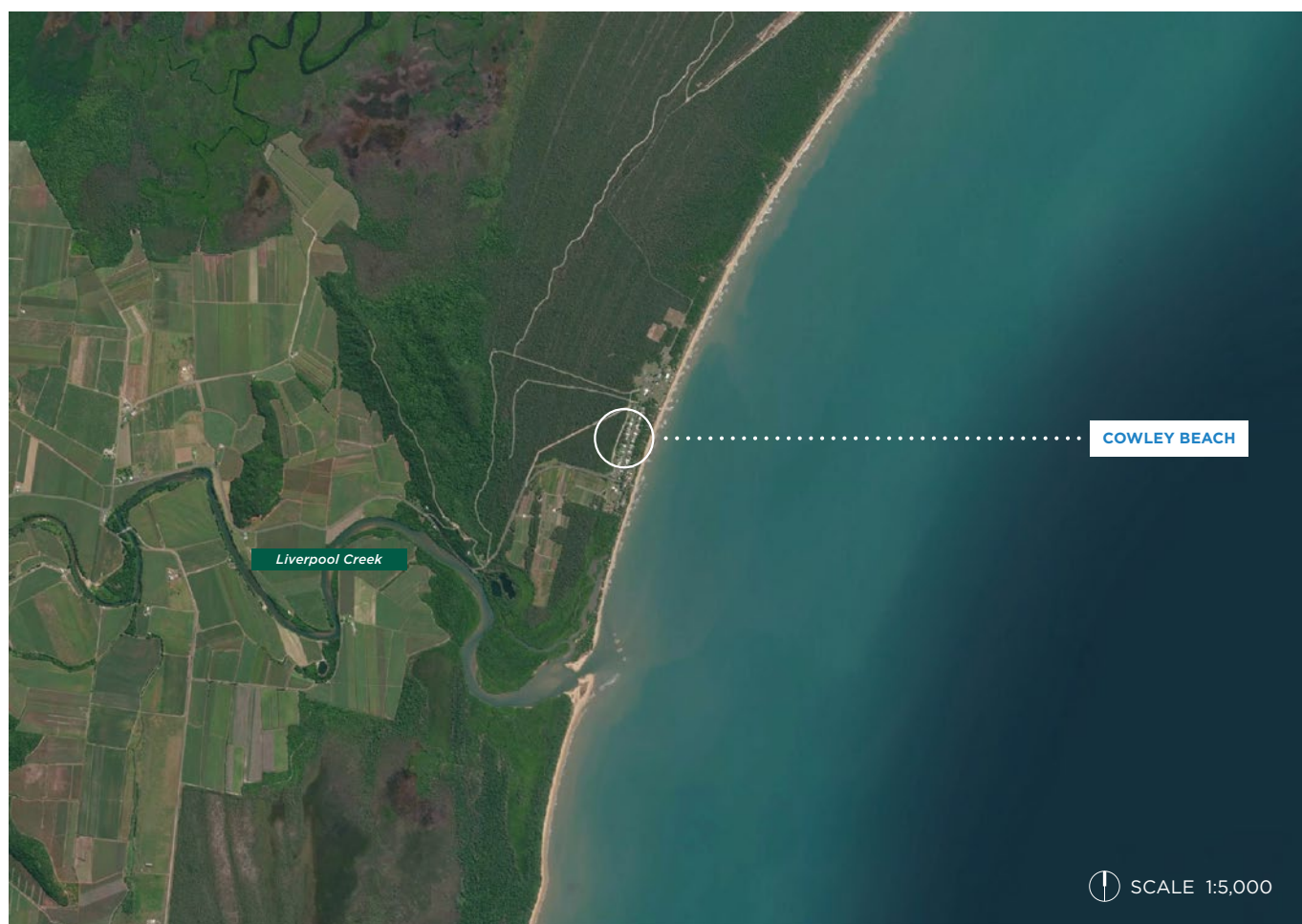


Figure 9. Cowley Beach Locality

OUR VULNERABILITIES AND RISKS

Close to the boat ramp, Cowley Hall (community centre), the caravan park, local roads and drainage infrastructure are at risk from erosion under all climates, with sea level rise affecting the caravan park site notably by 2100. There are a small number of residential land parcels immediately north of the boat ramp at risk from erosion under the present climate, where the coastal dune buffer is notably narrower, and the road is close to the existing beachfront. Risks to other areas such as rural and environmental management and conservation land mainly result from sea level rise.

WHAT'S IMPORTANT TO OUR COMMUNITY?




The Cowley Beach community values the natural coastal environment and scenery of the area combined with the ability to participate in many activities along the foreshore and in the water. Based on your feedback, the most important features to protect are the existing vegetation and vegetated spaces such as parks while ensuring these spaces remain useable.



OUR ADAPTATION PATHWAY

Table 6 outlines the adaptation pathway and triggers for Cowley Beach in response to local coastal hazards and risks over time under a changing climate.

Table 6 Cowley Beach Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> Mandate minimum floor levels for new development Ongoing active dune and habitat management 	●————→		
SETTLEMENT AREA	<ul style="list-style-type: none"> Community infrastructure planning and management of park, community and road assets 	●————→		
	<ul style="list-style-type: none"> Explore incentives to encourage residents to relocate or rebuild outside of hazard areas Explore landward relocation of community hall and caravan park 		●————→	
MILITARY TRAINING AREA	<ul style="list-style-type: none"> Ongoing active dune and habitat management Relocate important buildings on dune further landward 	●————→		



MOURILYAN HARBOUR AND ETTY BAY

MOURILYAN HARBOUR AND ETTY BAY COASTAL AREA

Etty Bay Beach is nestled along a narrow coastal plain between the Moresby Range and the Coral Sea. An iconic example of where the “rainforest meets the reef”, it is a popular destination for tourists and the local community and includes a surf lifesaving club and caravan park. Mourilyan Harbour sits near the mouth of the Moresby River and is an important natural deep water harbour containing port facilities largely catering for sugar exports. The Harbour also contains a popular public boat ramp and marine rescue facilities.



Figure 10. Mourilyan Harbour and Etty Bay Locality

OUR VULNERABILITIES AND RISKS

By 2100, sections of the cane railway network and the adjacent road access to Mourilyan Harbour are at high risk from erosion and storm tide where they pass close to the bank of estuarine waterways. At ETTY Bay, storm tide inundation and associated erosion will impact the surf lifesaving club, caravan park and sewer pump station. Sea level rise will expose more than 1,100 hectares of rural land in ETTY Bay, west of the Moresby Range by 2100 and will also impact adjacent rural residential land parcels.

WHAT'S IMPORTANT TO OUR COMMUNITY?

Mourilyan Harbour and ETTY Bay are used by the community to access the reef and waterways, enjoy the natural coastal environment and scenery, participate in recreational activities along the foreshore and attend social events with friends and family.

Based on your feedback, the key community values for this area and the most important features to protect are:

- The harbour (including infrastructure)
- Recreational amenities (e.g fishing and picnic areas)
- The beach
- Cassowary habitat

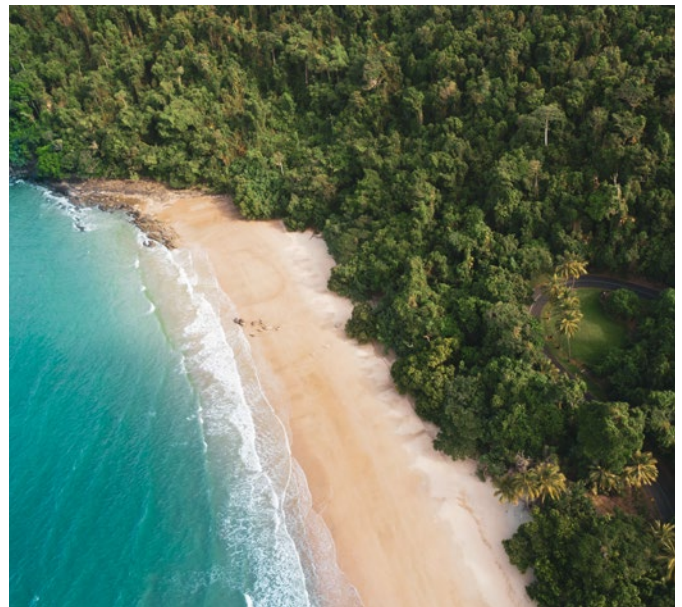





Image credit: Tourism Tropical North Queensland

OUR ADAPTATION PATHWAY

Table 7 outlines the adaptation pathway and triggers for Mourilyan Harbour and Etty Bay in response to local coastal hazards and risks over time and a changing climate.

- Minimum floor levels should be mandated for new development in all areas.
- The hazard resilience of infrastructure at Mourilyan Harbour should be improved through asset renewal.
- The open coast of Etty Bay will require ongoing foreshore management, relocation of key buildings and potentially occasional beach scraping.
- In the longer term, Etty Bay Road will need to be raised to increase resilience to the 2100 climate.

Table 7 Mourilyan Harbour and Etty Bay Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development 	●————→	————→	————→
MOURILYAN HARBOUR	<ul style="list-style-type: none"> • Upgrade hazard resilience of Coastguard and boat ramp facilities as part of asset renewal • Localised works involving: <ul style="list-style-type: none"> - raising of existing seawall crest levels - scour protection along access road / estuary interface - land level raising (coinciding with asset renewal) 			●————→
ETTY BAY (Open Coast)	<ul style="list-style-type: none"> • Ongoing active dune and habitat management • Relocate or consolidate key buildings further landward where practicable (aligned with planned upgrades if possible) • Explore progressive downsizing of caravan park to accommodate shoreline migration • Localised beach scraping as required 	●————→	————→	————→
ETTY BAY (West of Moresby Range)	<ul style="list-style-type: none"> • Accept loss of rural land 		●————→	
	<ul style="list-style-type: none"> • Raise Etty Bay Road 			●————→

INNISFAIL



INNISFAIL COASTAL AREA

Innisfail is the region's largest town and major service hub comprising a range of retail, business, government services, and health and education facilities. Located on the floodplain at the junction of the North and South Johnstone Rivers, about 5km inland from the coast, parts of the town are also highly vulnerable to impacts from river flooding.

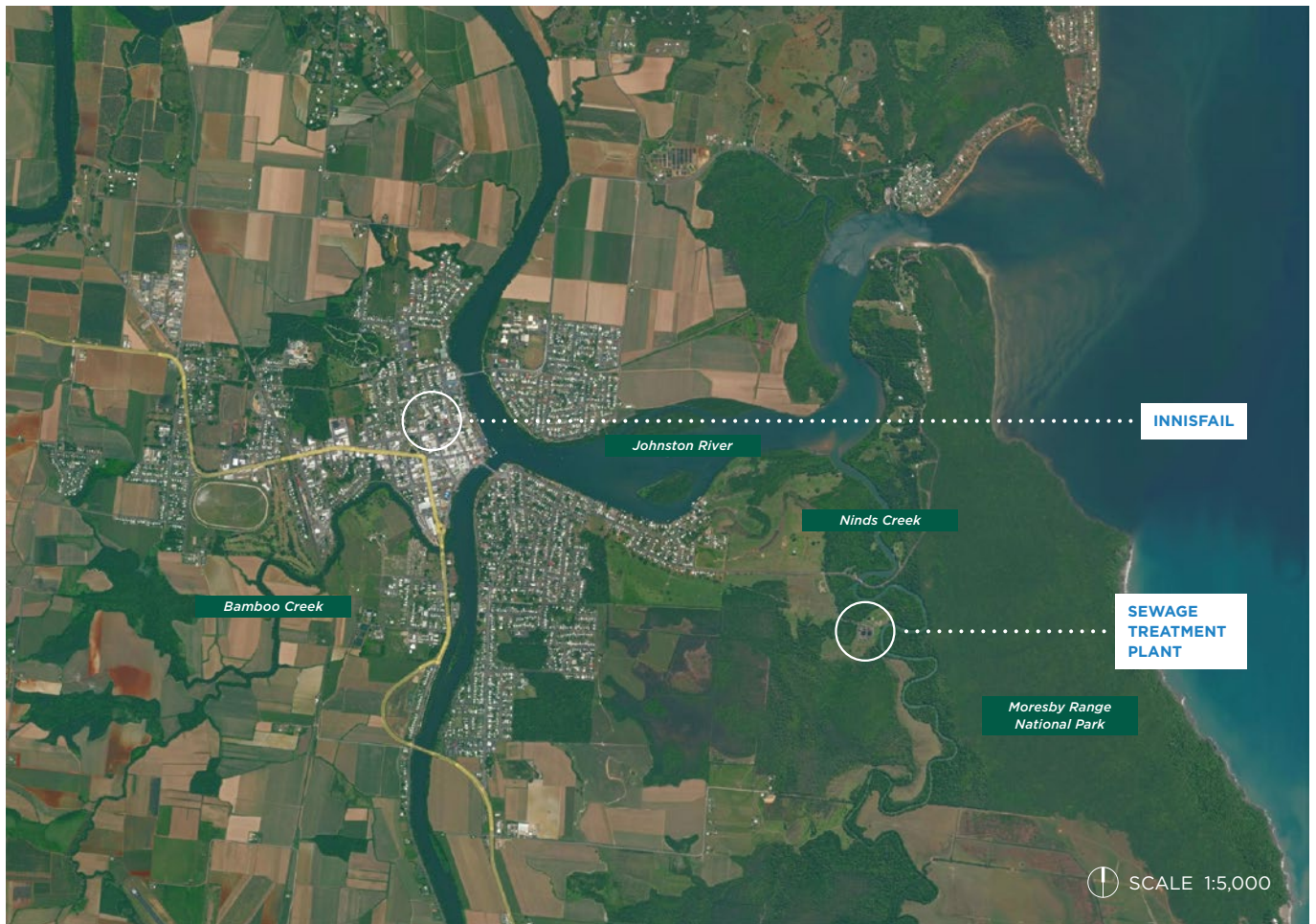


Figure 11. Innisfail Locality

OUR VULNERABILITIES AND RISKS

Most intolerable risks from coastal hazards in Innisfail occur along the tidal waterfront fringes of the river system and its tributaries. By 2100 substantial areas of residential and industrial properties in the south-eastern suburbs of East Innisfail and Webb are at risk from sea level rise and associated erosion, particularly via Ninds Creek. This inundation affects roads and utilities as well as the drainage network, which have the potential to exacerbate nuisance flooding of upstream areas, particularly during heavy rainfall coinciding with higher tides.

The Innisfail sewage treatment plant site is at risk from sea level rise and associated erosion under all climates. By 2100 infrastructure on the site is inundated by sea level rise and road access is severed, with some key infrastructure also at risk from erosion and storm tide hazards.

The fringes of and low-lying areas adjacent to Bamboo Creek and its tributaries are similarly affected, with tidal inundation affecting mainly rural land from 2050 onwards. Roads are also at risk from erosion under all climates include numerous streets along the Johnstone River. A number of bridges on these roads are also at risk, with eight bridges at high risk from erosion under all climates.

WHAT'S IMPORTANT TO OUR COMMUNITY?

The community values the natural assets of Innisfail including the river system which is abundant with mangroves. Based on your feedback, the key community values for this area and the most important features to protect are the natural environment including mangroves and assets such as the boat ramp and parks.






Image credit: Tourism Tropical North Queensland

OUR ADAPTATION PATHWAY

Table 8 outlines the adaptation pathway and triggers for Innisfail in response to local coastal hazards and risks over time and a changing climate.

- Minimum floor levels will need to be mandated for new development in all areas.
- The tide gates at Ninds Creek will need to be upgraded and the sewage treatment plant relocated.
- Tide gates or new revetments will need to be constructed at Bamboo Creek.
- ‘Soft’ and natural engineering solutions are proposed for other waterfront areas for the present climate.

Table 8 Innisfail Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development 	● →		
NINDS CREEK CATCHMENT	<ul style="list-style-type: none"> • Reduce intensity of future development • Upgrade tide gates 	● →		
	<ul style="list-style-type: none"> • Construct levees to limit penetration of sea levels around tide gates • Hazard resilient design for upgrades to existing sewage treatment plant infrastructure (including access roads) • Investigate alternative sewage treatment plant sites 		● →	
	<ul style="list-style-type: none"> • Relocate sewage treatment plant 			● →
OTHER WATERFRONT AREAS	<ul style="list-style-type: none"> • Restore/enhance natural ecosystems along waterways • Reduce intensity of future development • Review scour treatment at bridge crossings 	● →		
	<ul style="list-style-type: none"> • Construct tide gates on Bamboo Creek • Upgrade existing or new revetments to protect key infrastructure 			● →



COQUETTE POINT, COCONUTS AND FLYING FISH POINT

COQUETTE POINT, COCONUTS AND FLYING FISH POINT COASTAL AREA

This area includes the small coastal settlements of Coquette Point, Coconuts and Flying Fish Point. Located a short drive east of Innisfail, inside the mouth of the Johnstone River, Coconuts is a small residential community home to popular boat ramps and an outrigger canoe club on the foreshore parkland. Immediately north of the mouth of the river is Flying Fish Point, a beachfront residential area, with a tourist park, café and school. On the southern side of the river mouth, Coquette Point is a small, semi-rural residential area surrounded by high value conservation areas serviced by a single road access that crosses Ninds Creek. Most built infrastructure is on elevated land.



Figure 12. Coquette Point, Coconuts and Flying Fish Point Locality

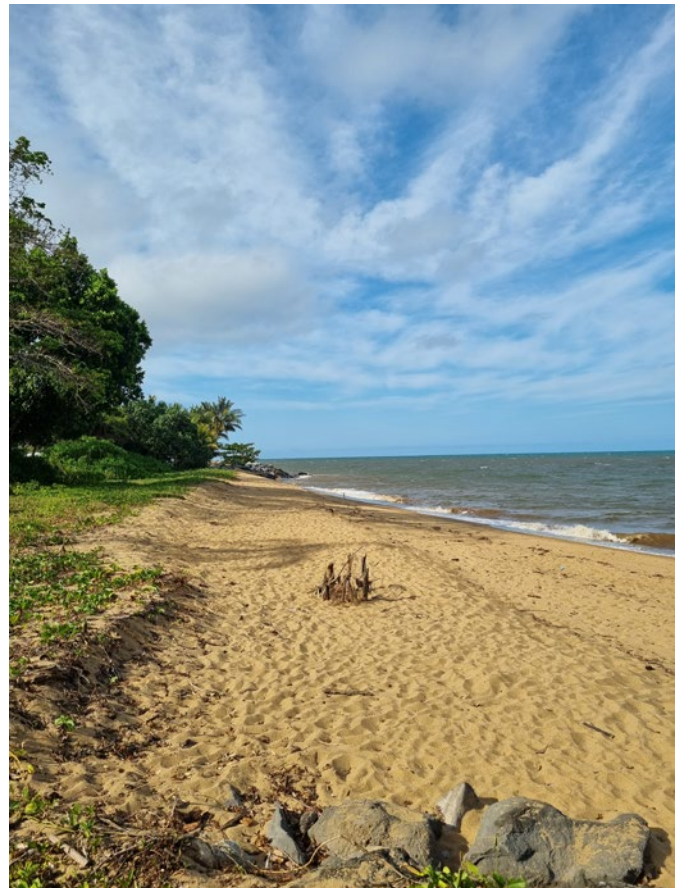
OUR VULNERABILITIES AND RISKS

All coastal hazards will result in the isolation of Coquette Point, particularly inundation at the bridge crossing of Ninds Creek. The other coastal communities are largely at risk from erosion and inundation, particularly buildings, structures, land and services directly adjoining the beachfront and creek and river systems:

- Coconuts is exposed to coastal erosion from the southeast as well as tidal inundation from the northwest. In addition, Bay Road, the sole road access to the community of Flying Fish Point, traverses this site.
- Flying Fish Point - Persistent erosion in the area for decades has resulted in the construction of extensive but occasionally discontinuous lengths of public and private seawalls, now extending to cover the majority of the beachfront.

WHAT'S IMPORTANT TO OUR COMMUNITY?

Based on your feedback, the key community values for this area and the most important features to protect are the natural environment, particularly the waterways, beach and mangroves as well as community infrastructure and open space such as parklands.






OUR ADAPTATION PATHWAY

Table 9 outlines the adaptation pathway and triggers for Flying Fish Point, Coconuts and Coquette Point in response to local coastal hazards and risks over time under a changing climate.

- Minimum floor levels will need to be mandated for new development in all areas.
- Natural restoration and enhancement actions, including active habitat management, are required in Coquette Point and Coconuts under the present climate.
- Infrastructure upgrades to maintain road connectivity to Coquette Point
- Develop overall seawall strategy for Flying Fish Point and explore long-term viability of Johnstone River frontage.

Table 9 Coquette Point, Coconuts and Flying Fish Point Adaptation Pathway

LOCATION	ADAPTATION ACTIONS	SHORT TERM  (Present coastal hazards risks)	MEDIUM TERM  (Coastal hazard risks around 2050 (0.3m sea level rise))	LONG TERM  (Coastal hazard risks around 2100 (0.8m sea level rise))
ALL AREAS	<ul style="list-style-type: none"> • Mandate minimum floor levels for new development 	●————→	————→	————→
COQUETTE POINT	<ul style="list-style-type: none"> • Restore/enhance natural ecosystems along Johnstone River frontage • Progressively raise level of Coquette Point Road (alongside measures for Ninds Creek, refer Table 8) 	●————→	————→	————→
COCONUTS	<ul style="list-style-type: none"> • Active habitat management along river frontage 	●————→		
	<ul style="list-style-type: none"> • Further investigate dune augmentation • Upgrade level of Bay Road 		●————→	
	<ul style="list-style-type: none"> • Investigate seawalls along river frontage 			●————→
FLYING FISH POINT	<ul style="list-style-type: none"> • Investigate opportunity for land buy-back or swap on Alice St • Develop plans for seawall design and alignment to fill gaps in existing seawalls 	●————→	————→	————→
	<ul style="list-style-type: none"> • Raise crest levels on existing “low” seawalls • Upgrade stormwater outlets to limit tidal inundation 			●————→



OUR IMPLEMENTATION PLAN

Everyone has a role in caring for our coast – First Nations Peoples, Council, Queensland Government agencies, businesses, community organisations, private landowners and the community. These roles include understanding the risks from coastal hazards and implementing adaptation actions in the Strategy.

Council's primary responsibility is in implementing adaptation actions to protect, maintain and manage Council-owned land, buildings, infrastructure and assets. Providing direction and guidance to support our communities to strengthen their resilience to climate change and coastal hazard risks already occurs through our legislative roles in land use planning and local disaster management.

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

Successful implementation of adaptation actions for many localities will require collaboration and partnerships between Council, community and other stakeholders, including the State Government.

An internal implementation plan has been prepared to guide how Council will embed adaptation actions and consideration of coastal hazard risks 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 activities to support the implementation of adaptation action.

The Implementation Action Plan covers short-term actions (over the next 5 years) and provides details on:

- Council plans, policies, strategies and processes to be updated or created to support action delivery.
- Indicative timeframes for delivery of actions
- Indicative costs for actions and potential funding sources.
- Recommended monitoring and evaluation approaches.
- Potential partnership and collaboration opportunities with the community, other stakeholders and external infrastructure providers.

Council will implement adaptation actions into its 'business as usual' activities using the following existing approaches:

- Community Plan, Corporate Plan and visioning
- Risk management policy and processes
- Emergency response and recovery planning
- Land use planning, including updates to the planning scheme
- Asset management plans and processes
- Infrastructure planning and decision making
- Community facilities planning
- Parks planning and management
- Natural environment protection and management

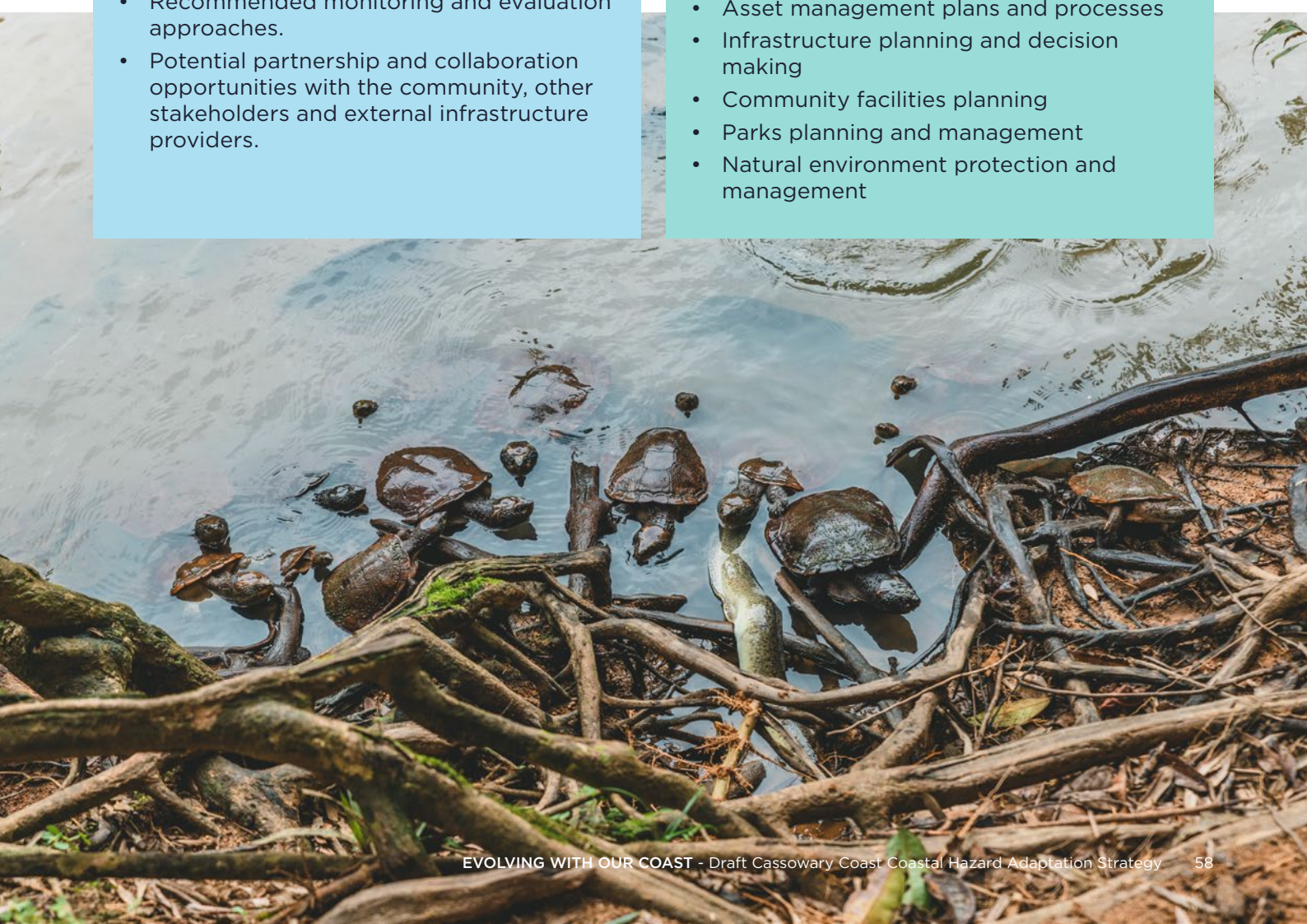


Table 10 provides a summary of key short-term (0-5 years) implementation actions for the region and specific localities.

Table 10 Summary of Key Implementation Actions for the Cassowary Coast Region

STRATEGIC ADAPTATION ACTIONS



COMMUNITY EDUCATION AND CONSULTATION

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' 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 other stakeholders and the community to share information and the responsibility in delivering adaptation actions.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

- Investigate opportunities to secure ongoing funding for a Coastal Resilience Program Officer to support the delivery of adaptation actions and implementation of the Strategy across the organisation.
- Establish and strengthen partnerships with Traditional Owners to support and implement adaptation actions.
- Identify stakeholders and residents that are likely to be directly impacted by coastal hazards and undertake targeted engagement and awareness raising of risks at least once per year, particularly for residents in low lying areas adjoining open beaches, waterways and estuaries.
- Facilitate training and education workshops, community awareness raising, community events across the Region and specifically at higher risk localities.
- Identify existing and new networks to share and promote knowledge sharing and understanding of coastal hazard risks and adaptation.
- Facilitate resident and community awareness raising on the value of dunes and coastal vegetation and their role in dune management and protection
- Prepare education material (e.g. fact sheets, information kits) on resilient building design to support residents in improving the resilience of their homes that can be used as constant reference material to explain key concepts such as risk-based planning, coastal hazards, climate change and Council's role in addressing these challenges.



MONITORING

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 need a monitoring and review program to determine if trigger points for adaptation actions remain relevant, effective, timely and cost appropriate.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

Seek State and Federal Government funding to:

- Establish a photo monitoring program (CoastSnap or similar) across the coast, prioritising key sites and localities.
- Establish a beach monitoring program.
- Undertake monitoring for key select areas.



EMERGENCY RESPONSE

Emergency response and disaster management is everyone’s responsibility. Council, State Emergency Service, volunteers and local disaster management groups are particularly key in leading the response to keep the community safe. Council’s Disaster Management Plan provides information on preparation, response and recovery to potential coastal hazard events.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

- Review and update the Cassowary Coast Region Local Disaster Management Plan with updated coastal hazard mapping and embed risk outcomes in emergency management and response planning.
- Review and update emergency management response for higher risk areas of key localities.



HAZARD AVOIDANCE FOR NEW AND REPLACEMENT COMMUNITY INFRASTRUCTURE

There may come a point where Council or other public asset owners need to replace or upgrade community infrastructure regardless of coastal hazards. Where this happens, care should be taken to avoid locating new important community infrastructure with a long design life in hazard areas.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

- Review and update asset management plans for priority infrastructure at risk and integrate consideration of current and future coastal hazard risks.
- Council to liaise with the State Government and other infrastructure asset owners and take a lead advocacy role and advocate for the consideration of coastal hazard risks in the upgrade and maintenance of important rail, road and electricity infrastructure in the region.



GENERAL LAND USE PLANNING MECHANISMS

Land use planning establishes certainty for community and development expectations. Council will ensure its planning frameworks and controls allow for only risk appropriate land uses to be located in hazard areas and reduce infrastructure exposure to future coastal hazard risk areas through implementation of planning tools such as hazard resilient design requirements and minimum floor planning levels.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

- Review planning scheme to reflect the direction and outcomes of the Strategy.
- Integrate coastal hazard risk considerations into all strategic planning processes for future communities and master plan and structure plan areas.
- Council to consider 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.



TARGETED INVESTIGATIONS

The selection of adaptation responses in some areas will benefit from site-specific investigations such as detailed erosion studies to better refine the understanding of natural coastal processes at the beach segment scale. Geotechnical investigations can also locate potential offshore sand reserves for beach nourishment purposes.

Indicative Priority Implementation Actions (to be completed within 0-5 years)

- Undertake a Shire wide sand sourcing investigation to inform the feasibility of dune augmentation and beach nourishment activities.

WHERE TO FROM HERE?

The Evolving with Our Coast Strategy will be reviewed every 5 years and at least 1 year before the planning scheme is reviewed, so that updated technical information informs our strategic land use planning and infrastructure forward planning processes. Triggers to update the Strategy include:

- Any changes to the legislative, planning and policy framework e.g. the State changes the sea level rise projections to be considered in planning (currently 0.8m by 2100) or how coastal hazards are defined etc.
- Substantial new development or notable changes to the coastal landscape and landforms.
- Updated technical information including coastal hazard modelling, risk assessment, monitoring data or changes to coastal hazard indicators, particularly following the occurrence of a major tropical cyclone.

Examples of environmental triggers that might be used could include:

- Data and images from photo monitoring sites across the coast.
- The potential for permanent loss or frequent damage to coastal vegetation.
- Records of infrastructure damaged or significantly impacted by erosion.
- Number of properties (including public land) that is potentially and significantly impacted.
- The frequency and significance of damage to infrastructure and roads.
- Vegetation loss and ecosystem shift or migration through saltwater intrusion.
- Frequency and significance of damage to community infrastructure.

HOW YOU CAN BE INVOLVED

- The Queensland Government has developed tools to help households start taking the first steps to identify and respond to climate related risks. The tools include information on climate change, checklists to assess risks and links to other resources.
- You can access these resources on the Queensland Government website [here](#) and [here](#).
- Council also has a number of resources available on their website which you can access [here](#).





Image credit: Tourism Tropical North Queensland

GLOSSARY



ADAPTATION THEMES

ACCOMMODATE

Accommodate hazards by adapting existing infrastructure to be resilient to coastal hazard impacts. Examples include hazard resilient infrastructure (e.g. designing infrastructure to cope with salt water exposure or undermining), mandating minimum floor levels through the planning scheme and raising land levels with imported soils.

AVOID

Avoid placing new development in high and extreme risk hazard areas through community infrastructure planning and management, reducing the intensity of future development and maintaining, reviewing or implementing coastal building lines/development setbacks.

BUILD COMMUNITY RESILIENCE

Build community awareness of coastal hazards through wide communication about the risks from coastal hazards (hazard mapping available from Council's website) and education about adaptation.

RESTORE AND ENHANCE

Restore and enhance natural coastal ecosystems as the first line of defence. Examples include active dune and habitat management, beach scraping, beach nourishment, dune augmentation and restoration and the establishment of green belts and riparian corridors/buffers. Beach nourishment involves the manual placement of sand on the beach to supplement the existing beach volumes.

DEFEND

Defend existing development in coastal areas using structures, including seawalls or revetments, groynes, levees/dykes/low earthen bunds and tidal gates/surge barriers.

TRANSITION

Over time, transition existing assets and buildings out of higher-risk areas. Examples of this include the relocation of important public or community assets to a new location outside the hazard zone or transitioning land use to one which has a higher tolerance to coastal hazards.

COASTAL HAZARD ADAPTATION

Actions undertaken to eliminate or limit the risks posed by a coastal hazard (i.e. sea level rise, storm tide inundation and coastal erosion). Adaptation can involve many small steps over time or major transformation with rapid change. Climate change is expected to increase the extent, severity and frequency of coastal hazards.

For example, tropical cyclones are expected to be more intense and a greater extent of low-lying land will be affected by periodic inundation because of sea level rise.

COASTAL HAZARD RISK

The Strategy focuses on the coastal hazards of storm tide inundation and coastal erosion and how these coastal hazards are expected to change under the influence of sea level rise from future climate change.

The extent of coastal land potentially impacted by coastal hazards, as well as the consequences of these coastal hazards, are expected to increase into the future. Risk refers to the combination of likelihood (or how often we think a coastal hazard may occur) and the consequence of it occurring (or what we expect an impact of the coastal hazard to look like).

HAZARD

A hazard is a source or a situation with the potential for harm in terms of human injury, damage to property, impact to the environment or society etc, or a combination of them.

LIKELIHOOD

Likelihood is the chance of something happening that will impact on things that matter to us.

RESILIENCE TO COASTAL HAZARDS

Strengthening our understanding of current and future risk, better management of risk, and improving how we prepare for, respond to and recover from coastal hazard events.





Image credit: Tourism Tropical North Queensland