COASTAL FUTURES STRATEGY

ENDORSED BY COUNCIL 25 AUGUST 2021

Fraser Coast Regional Council

Queensland Government

QCoast2100

LGAQ

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Lady Elliot Island

MAYOR'S MESSAGE

The Coastal Futures Strategy is a roadmap to guide our immediate, medium and long-term planning for the impacts of our changing coastline.

Our coastline is very important: It is our playground and it is the source of much of our livelihoods as thousands of tourists come here every year to relax on our beaches, fish, swim or sail.

But coastlines are dynamic, ever-changing with each tide or storm event, or over long timeframes.

Natural processes and changes to our coastline impact on how we use and enjoy the coastline. Our strategy has investigated the current and future impacts of coastal hazards, which affect our region and are expected to have a greater impact over time.

Our strategy has been shaped by community engagement. Your feedback has helped to identify the areas we value, how we use the coastline and how Council should respond and plan for our changing coastline.

The strategy includes both regional actions that will benefit our entire coastline as well as adaptation pathways for our coastal communities, demonstrating our commitment to short term action and a flexible approach to longer term planning.

Responding to the present and future challenges coastal hazards present to our lifestyle, economy, environment and cultural values requires future planning, investment and decision making to ensure there is a coordinated and informed response to coastal hazards, now and into the future.

Cr George Seymour

Fraser Coast Mayor

OUR COASTAL FUTURES STRATEGY

The Coastal Futures Strategy is a Coastal Hazard Adaptation Strategy for our region. The strategy provides:

A strong evidence base for future decision making and a coordinated response for what actions we will take to adapt to and manage coastal hazard risks.

A framework to guide the management of our coastline. This includes:

- Corporate and operational planning and financial planning
- Land use planning and development assessment
- Infrastructure planning and management including roads, stormwater and foreshores
- Asset management and planning including nature conservation, recreation, cultural heritage values and other public amenities
- Community planning
- Emergency management

OUR CHANGING COASTLINE

While cyclones and large storms cause significant damage to our coastline, even minor to moderate storm events coinciding with high tides can result in significant issues for our coastal communities

This was the case in December 2020 when a king tide event affected the Great Sandy Strait coastal communities (see photo below right).

This event occurred following a storm event the previous day, which contributed to inundation of properties.

Fortunately, there was minimal wind and no storm tide effect exacerbating the inundation.

Many of our coastal townships are low-lying, with housing and community assets in close proximity to the coast, making our region particularly vulnerable to the current and future impacts of coastal hazards.

Shaped by natural coastal processes, our coastline is changing.

Most people are aware of the daily changes to our coast, beaches and dunes caused by tides, wave and wind action. Some of us may have also experienced more extreme coastal hazard events in our region, such as Cyclone Roger in 1993.

Esplanade flooding 1920's
Image credit: Hervey Bay Historical Society

Tidal surge affecting The Esplanade, Urangan circa 1980s.
Image credit Hervey Bay Historical Village and Museum

Inundated Turton Street and Tuan Esplanade,
Tuan, December 2020.

COASTAL HAZARDS

Coastal hazards originate from the sea. They can occur rapidly during significant storm events or develop over years to decades in response to long term natural coastal processes. They can also result in temporary or permanent changes to our coastline.

The Coastal Futures Strategy focuses on three coastal hazards that affect our coastline. They are:

Storm tide inundation: The temporary flooding of low-lying land which occurs during high tides combined with storms and cyclones. It can result in wave overtopping of the open coastline or inundation of land behind the open coastline by waterways, estuaries and stormwater systems connecting to the ocean.

Permanent inundation due to sea level rise: The regular or permanent inundation from the tidal cycle, including up to the highest astronomical tide. Sea level rise also increases the extent of land subject to coastal erosion and storm tide inundation.

A 0.8m increase to mean sea level by 2100 is currently planned for by the Queensland State Government.

Coastal erosion: The loss of land, beach or dunes by wave or wind action, tidal currents, water flows or sea level rise. Coastal erosion can be short term or long term, temporary or permanent.

Urangan, December 2020

Burrum Heads storm damage, 2011

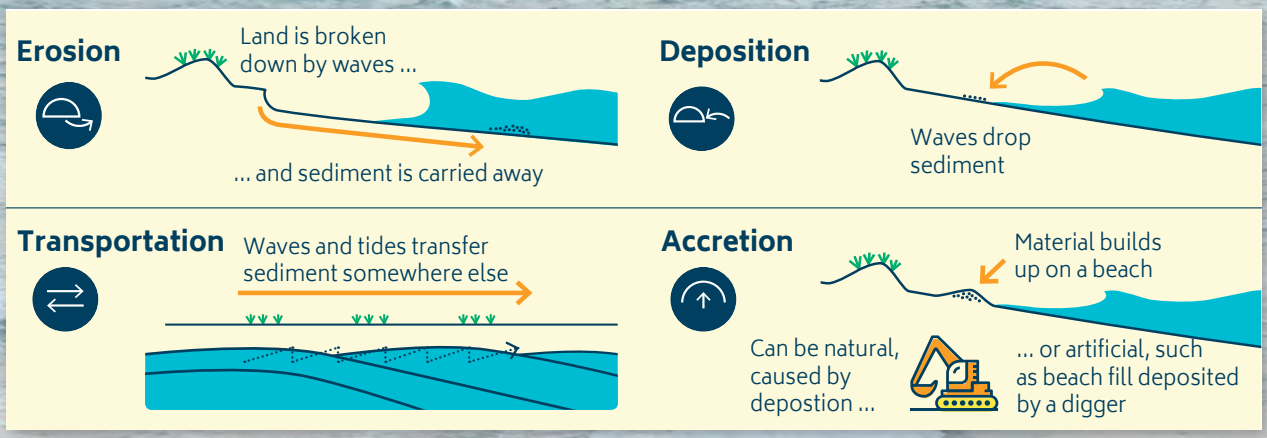
Seafront Oval, Pialba, January 2013
Image credit: Hervey Bay Historical Society

PLANNING OUR CHANGING COASTLINE

The Coastal Futures Strategy has been predominantly funded by the Queensland Government and Local Government Association of Queensland (LGAQ) QCoast$_{2100}$ Program.

In addition to funding, the program provides the methodology for Queensland Coastal Councils to prepare a Coastal Hazard Adaptation Strategy outlined in the *Minimum Standards and Guidelines for Queensland* (LGAQ & DEHP, 2016).

THE PROCESSES THAT SHAPE OUR COAST ARE:



CLIMATE CHANGE MAY AFFECT COASTAL PROCESSES

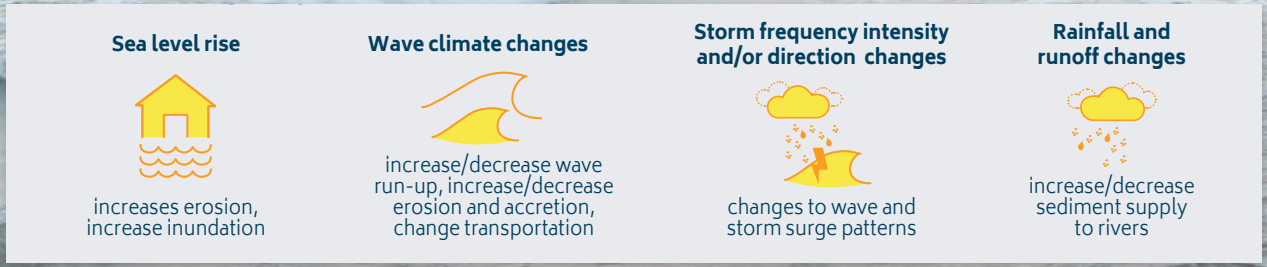


Image credit: Coast Adapt, Australian Government

The process involves eight (8) phases of work, grouped by three key themes. They are:

COMMIT AND GET READY

Phase 1 – 2 was about understanding our community and designing a project that was fit for purpose for the Fraser Coast region.

1. Plan for life-of-project stakeholder communication and engagement
2. Scope coastal hazard issues

IDENTIFY AND ASSESS

Phase 3-5 involved the technical work of identifying priority assets and community values at risk, the level of expected impacts and arriving at a risk level for coastal localities in the study area.

3. Identify areas exposed to current and future coastal hazards
4. Identify key assets potentially impacted
5. Risk assessment of key assets in coastal areas

PLAN, RESPOND AND EMBED

The final phase involves translating the risk assessment into strategies for adaptation. Weighing up the options for efficacy, acceptability, cost and benefits to arrive at the chosen pathways for adaptation

6. Identify potential adaption actions
7. Socio-economic appraisals of adaption options
8. Strategy development, implementation and review

COUNCIL'S ROLE

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

		LAND AND ASSET TYPE		
		Council owned and managed such as Wetside Water Park	Public land and assets managed by other authorities such as K'gari (Fraser Island)	Private Assets such as homes and businesses
COUNCIL'S ROLE	Inform	**Led by Council**	**Led by Council**	**Led by Council**
	Observe	**Led by Council**	**Limited role for Council**	**Limited role for Council**
	Plan	**Led by Council**	**Limited role for Council**	**Limited role for Council**
	Act	**Led by Council**	**Limited role for Council**	**Limited role for Council**

Observe

Council undertakes regular surveys of the Hervey Bay shoreline to understand changes to the beach profile as well as to inform coastal protection works.

Council owned and managed assets affected by coastal hazards are observed as part of asset maintenance programs.

Whilst Council does not generally observe changes to the coastline for state managed areas and private assets, Council does maintain aerial photography and subscribes to historical aerial imagery services which allow investigation into changes to our coastline when necessary.

Inform

Council currently provides mapping for storm tide inundation and Erosion Prone Area extents as part of the *Fraser Coast Planning Scheme 2014**. This is available for our region as online interactive mapping.

Council also provides information about coastal hazards through the *Disaster Dashboard*, an online and interactive mapping tool used for disaster management planning.

**Note: the current planning scheme mapping is not the mapping developed in the Coastal Futures project. Council will collaborate with the State Government to update this mapping.*

Plan

Council plans for the current and long term impacts of coastal hazards through the *Fraser Coast Planning Scheme 2014*, which provides policy guidance and planning controls for land use and development.

Council also develops Shoreline Erosion Management Plans for sections of the region's coastline.

Act/Protect

Council's current coastal management activities are shown in 'Council's Current Management Approach' on pages 12 and 13.

Council has an existing policy which outlines that coastal protection works for private property should be at the expense of the beneficiaries.

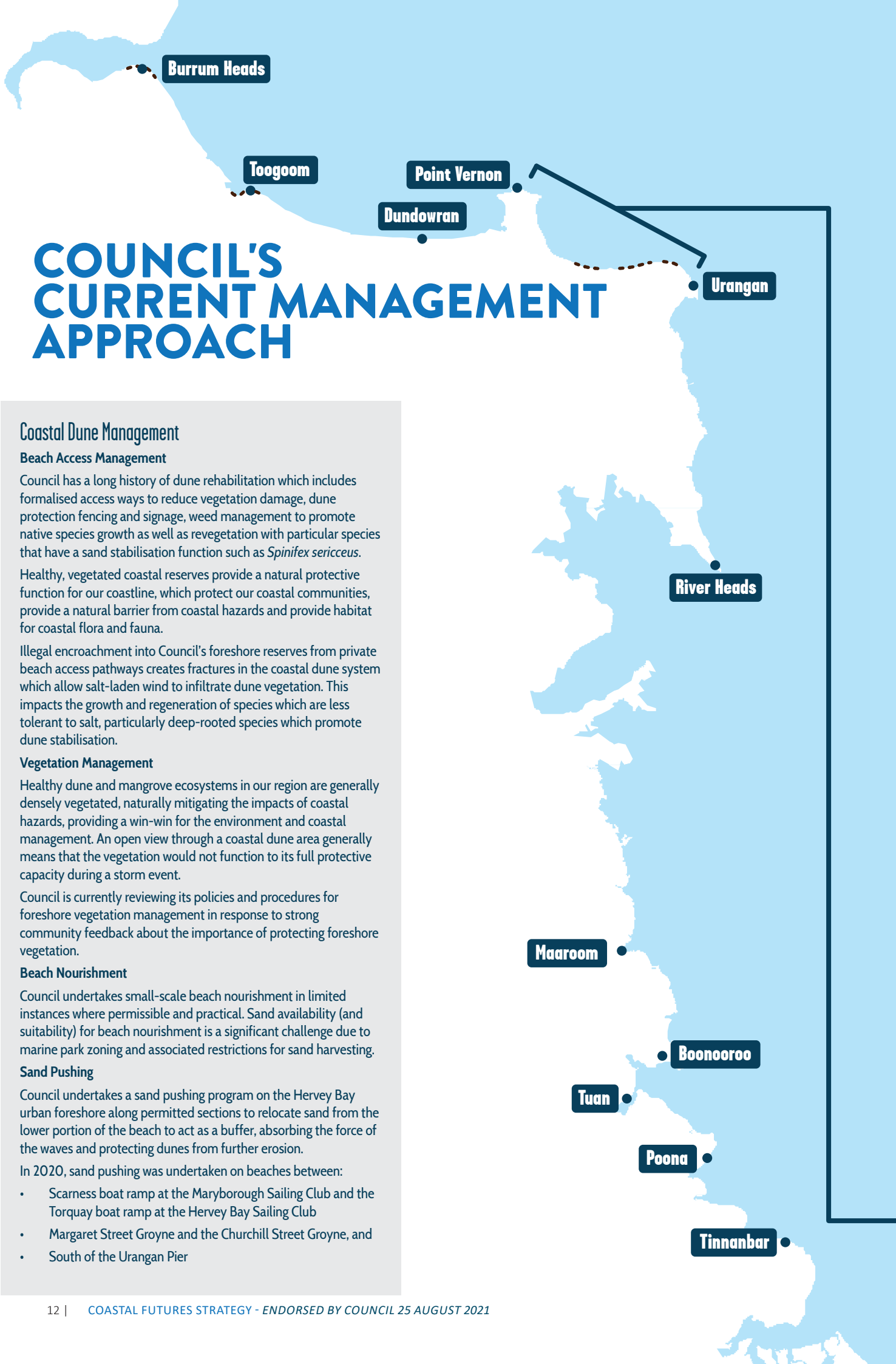
Key State Legislation

- The ***Coastal Protection and Management Act 1995*** supports the protection of the coast and coastal resources. It supports and informs planning decisions through the declaration of Erosion Prone Areas, Coastal Management Districts and the setting of development assessment codes for the *Planning Act 2016.*
- The ***Planning Act 2016*** sets out the State's interests for protection of the coastal environment and management of coastal hazards (such as erosion prone area, storm tide inundation and Coastal building line) through the State Planning Policy. The State Planning Policy requires all Councils to plan for 2100 in considering coastal hazards and climate change impacts for strategic land use planning.
- The ***Fisheries Act 1994*** sets the regulatory framework which seeks to protect and conserve marine plants (alive or dead) and ensure sustainable fisheries resources. The *Fisheries Act 1994* does facilitate the removal of marine plants e.g. seeking approval for establishing a jetty, collecting dead marine wood as a hobby or for limited trade.
- Conservation of the marine environment (and reasonable use of natural resources, including sand) is established by the ***Marine Park Act 2004*** through zoning, designated areas, entry and use provisions and permits.
- The ***Local Government Act 2009*** provides a way in which the local government is constituted and the nature and extent of its responsibilities and powers, it also provides a framework for the system of local government in Queensland.

Key Local Instruments

- The ***Fraser Coast Planning Scheme 2014*** was prepared under the relevant State planning legislation and includes provisions to manage development in coastal areas.
- Council **Local Laws** – are prepared in accordance with the requirements of the *Local Government Act 2009*. Council has local laws applying to coastal areas and the foreshore which ranges from controlling activities on beaches, piers, jetties, pontoons, bathing reserves, restricting driving on the beaches, litter and vegetation damage.

COUNCIL'S CURRENT MANAGEMENT APPROACH



Coastal Dune Management

Beach Access Management

Council has a long history of dune rehabilitation which includes formalised access ways to reduce vegetation damage, dune protection fencing and signage, weed management to promote native species growth as well as revegetation with particular species that have a sand stabilisation function such as *Spinifex sericceus*.

Healthy, vegetated coastal reserves provide a natural protective function for our coastline, which protect our coastal communities, provide a natural barrier from coastal hazards and provide habitat for coastal flora and fauna.

Illegal encroachment into Council's foreshore reserves from private beach access pathways creates fractures in the coastal dune system which allow salt-laden wind to infiltrate dune vegetation. This impacts the growth and regeneration of species which are less tolerant to salt, particularly deep-rooted species which promote dune stabilisation.

Vegetation Management

Healthy dune and mangrove ecosystems in our region are generally densely vegetated, naturally mitigating the impacts of coastal hazards, providing a win-win for the environment and coastal management. An open view through a coastal dune area generally means that the vegetation would not function to its full protective capacity during a storm event.

Council is currently reviewing its policies and procedures for foreshore vegetation management in response to strong community feedback about the importance of protecting foreshore vegetation.

Beach Nourishment

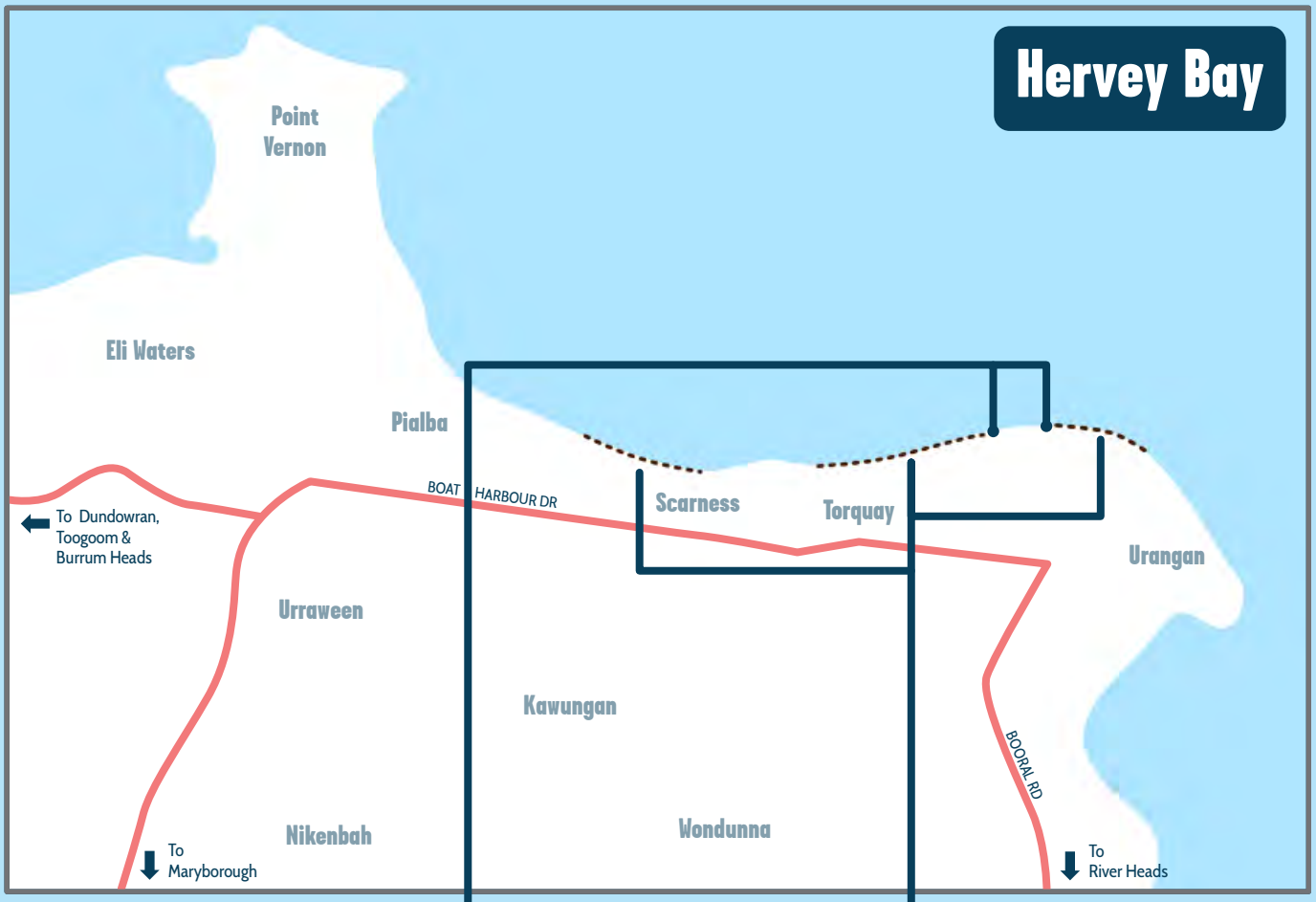
Council undertakes small-scale beach nourishment in limited instances where permissible and practical. Sand availability (and suitability) for beach nourishment is a significant challenge due to marine park zoning and associated restrictions for sand harvesting.

Sand Pushing

Council undertakes a sand pushing program on the Hervey Bay urban foreshore along permitted sections to relocate sand from the lower portion of the beach to act as a buffer, absorbing the force of the waves and protecting dunes from further erosion.

In 2020, sand pushing was undertaken on beaches between:

- Scarness boat ramp at the Maryborough Sailing Club and the Torquay boat ramp at the Hervey Bay Sailing Club
- Margaret Street Groyne and the Churchill Street Groyne, and
- South of the Urangan Pier



Groynes

Two groynes have been constructed in Urangan. They have been designed to be used as a viewing and fishing platform, providing a complementary recreational benefit to the primary coastal protection function.

Rock Revetment Walls

- Burrum Heads – Lions Park to Dudley Street
- Toogoom – in the vicinity of Toogoom Boat Ramp and a section of Kingfisher Parade
- Scarness Beach – in the vicinity of Scarness Jetty and Scarness Caravan Park
- Torquay - Boat ramp to Alexander Street. The seawall fronting Bill Fraser Park in front of Hervey Bay Sailing Club and the Surf Lifesaving Club has been constructed as concrete steps, providing a 'beach furniture' function.
- Urangan to Shelly Beach, with a concrete seawall in the vicinity of Elizabeth Street, Urangan.
- Planning and design investigations are also underway for additional coastal protection works in Urangan.

Asset Monitoring and Design

Council monitors the condition of coastal assets to inform maintenance and replacement programs. New coastal assets are selected or designed to withstand the impacts of the coastal environment.

Hervey Bay Shoreline Management Plan

(Halcro Street to Dayman Park)

Identifies preferred coastal protection treatments for priority locations of the shoreline between Point Vernon and Urangan to manage erosion of the foreshore.

Community Education, Involvement and Awareness

- Burrum Heads – Lions Park to Dudley Street
- Toogoom – in the vicinity of Toogoom Boat Ramp and a section of Kingfisher Parade
- Scarness Beach – in the vicinity of Scarness Jetty and Scarness Caravan Park
- Torquay - Boat ramp to Alexander Street. The seawall fronting Bill Fraser Park in front of Hervey Bay Sailing Club and the Surf Lifesaving Club has been constructed as concrete steps, providing a 'beach furniture' function.
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HOW WE ENGAGED

Your feedback has played an integral role in the development of the Coastal Futures Strategy.

August 2019

Establishment of a Key Stakeholder Group

Open invitations to join the Coastal Futures Key Stakeholder Group were widely advertised prior to workshops and directly sent to contacts on various Council databases.

The group provided input into the development of the strategy over three workshop sessions (August 2019, November 2019 and February 2020) and directly received project updates.

July/August 2019

Coastal Values Survey

The Coastal Values Survey involved:

- Sharing information on coastal hazard extents (Storm Tide Vulnerability Zone Maps made available).
- Identifying what places and aspects of the coast you value most.

View the Engagement summary report ***here.***

A kids colouring competition was undertaken to generate interest in the project and encourage people to visit the dedicated website.

July/August 2020

Adaptation Strategies Survey

The Adaptation Strategies survey involved:

- Sharing information about coastal values and vulnerabilities for each locality.
- Outlining what we need to think about when considering adaptation options.
- Seeking feedback on what types of adaptation responses you think are acceptable.
- Understanding how you would like to be involved in ongoing implementation of the Strategy.

View the Engagement summary report ***here.***

Locality bulletins provided an update on the project so far as well as background information about the adaptation strategies being proposed.

Project duration

Open invitations to make presentations about the project were sent to schools and community groups. In response to requests, the following activities were undertaken:

- Multiple school group presentations, including the School Captains Network (Maryborough and Hervey Bay), Fraser Coast Anglican College Year 10 Humanities and Social Science class and Tiaro Primary School.
- Presentations to multiple community groups as part of the Small Communities Advisory Group meetings.
- Onsite meeting with the Poona Progress Association to view coastal hazard affected areas.
- Presentation at Maaroom Community Group meeting.

Engagement activities at a glance

1000+ PEOPLE engaged

936 Survey respondents

6 Library displays

3 Day pop up event

8 Key stakeholder workshops

4 Media articles in local newspapers

Online Engagement Hub

7 Locality factsheets

2 Internal Council workshops

Radio advertising

Colouring-in competition

School visits

Targeted stakeholder workshops and meetings

Dedicated project webpage

SOCIAL MEDIA

Regular social media posts

1 paid Facebook post with **284** reactions, **35** comments, and **19** shares

OUR COASTAL VALUES

Our coastal landscape and natural areas support a variety of places that hold special cultural, environmental, and economic values to residents and visitors.

Our coastline supports a range of natural, built and cultural features that we value as a community.

Our coast underpins our community wellbeing, liveability and regional economic prosperity.

Community feedback as part of this project has helped to define these values and has reinforced that our communities value coastal areas in different ways.

Our Coastal Values survey found that Toogoom respondents value passive recreational activities such as swimming and dog walking, whilst respondents from Poona value the fishing opportunities and boat access to the Great Sandy Strait.

Recognising that each locality is unique and that we use our coast in different ways, this strategy has sought to understand the unique nature of our various localities.

An overview of how we use our coast, identified through through your feedback, is provided in the map below.

OUR ENVIRONMENT

Includes values such as:

- An inviting sandy beach
- Watercourses and wetlands
- Vegetation

OUR ECONOMY

Includes values such as:

- Tourism industry e.g. accommodation and hospitality

OUR LIFESTYLE

Includes values such as:

- Easy access to the water
- Fishing opportunities along the coastline
- Various recreational beach activities

OUR INDIGENOUS CULTURAL HERITAGE

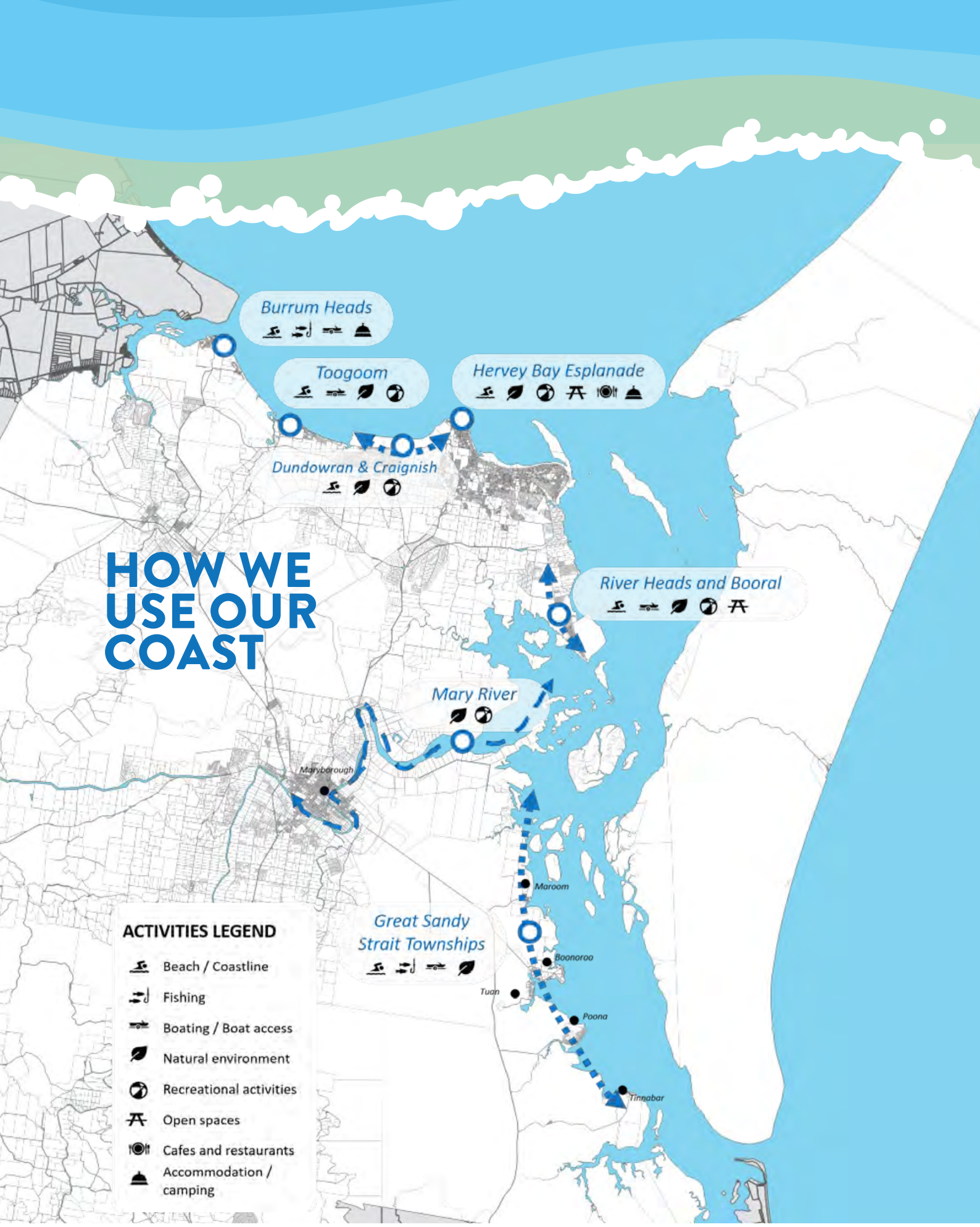
Includes values such as:

- Artefact scatters
- Cultural sites

OUR CULTURAL HERITAGE

Includes values such as:

- State and local heritage places


HOW WE USE OUR COAST
Burrum Heads
Toogoom
Hervey Bay Esplanade
Dundowran & Craignish
River Heads and Booral
Mary River
Maryborough
Maroom
Great Sandy Strait Townships
Boonoroo
Tuan
Poona
Tinnabar
ACTIVITIES LEGEND
Beach / Coastline
Fishing
Boating / Boat access
Natural environment
Recreational activities
Open spaces
Cafes and restaurants
Accommodation / camping

OUR COASTAL ENVIRONMENT

Our coast is a scenic landscape characterised by a unique combination of coastal landforms including rocky headlands, long coastal stretches as well as pocket beaches, estuaries, mangroves, bays, dunes and offshore reefs.

We recognise that areas along the coast have high ecological value and provide important habitat and nesting grounds for a diverse range of flora and fauna. Our nature reserves, beaches and K'gari (including access to and from) are key assets that we want to protect. Waterways and wetland areas such as Beelbi Creek, O'Regan Creek Conservation Park, Eli Creek and the Mary River are important habitat areas for native species.

The foreshore reserves along our coastline provide an ecological linkage or wildlife corridor that supports habitat, wildlife movements and opportunities for migration.

27%
of our land area is national park[1]

3,528
Wildlife species

50
Rare or threatened plant species

OUR COASTAL ECONOMY

$378.1
Total tourism and hospitality sales in the Fraser Coast Region (total value add of $188.5m)

5,976
Local coastal based businesses in 2018/2019

34,531
Local based jobs in 2018/19

Our coast underpins the local economy, offering unique experiences which attract and drive tourism related spending.

It also indirectly supports the economy by creating an environment that draws new residents and businesses to our region.

Coastal dependent infrastructure such as boat ramps and jetties are also integral for the local economy, providing direct access to our waterways for activities such as fishing, transport, recreation, tours and adventure sports.

OUR COASTAL LIFESTYLE

Our coastal places create our relaxed, outdoor, beach lifestyle. Towns and residential areas span the length of our coastline, and today approximately 65% of our population live within 5km of the coast.

All coastal areas in the Fraser Coast region are important to us and this is reinforced by our coastal living focus. Sweeping sandy beaches and foreshore parklands support important opportunities for tourism and enable us to boat, fish, swim, walk and gather on the coast. Water-based recreational activities and being amongst the natural environment are something we highly value.

80%
of respondents said having an inviting sandy beach was extremely/very important

530km
Coastline

25+
Public boat ramps across the LGA

OUR CULTURAL VALUES

Survey respondents highly valued the relaxed coastal lifestyle offered by the Fraser Coast. Hervey Bay displays its origins as low-key holiday destination in the historic shops, recreation areas and beach cottages that have survived.

Heritage shapes who we are and where we came from. It is a significant contributor to the identity and sense of belonging of a community. It provides a community with the ability to examine their history and traditions and have meaningful connections to their past. It also has the potential to provide the setting for experiences that support economic development and other opportunities. There are 21 heritage places across our region that have been identified as at risk from coastal hazards.

OUR COASTAL INDIGENOUS CULTURAL VALUES

Ancient fish traps, shell middens and scar trees are evidence of the Butchulla people's connection to country, many of these occur in the coastal environment and are at risk from permanent loss.

Council acknowledges Aboriginal and Torres Strait Islander peoples as the original inhabitants of Australia and recognises that the loss of cultural assets due to changes caused by coastal hazards is a key challenge.

OUR KEY FINDINGS

The impacts of coastal hazards are predicted to increase with a changing climate. Developing this strategy involved updating Council's existing coastal hazard mapping based on the best available science and the QCoast2100 Program methodology.

State wide mapping of coastal hazards is already publicly available for the entire Queensland coastline, including Fraser Coast. The Identify and Assess stage of developing this strategy involved updating this mapping based on the best available science and the QCoast2100 Program methodology.

Specialist coastal engineers modelled coastal hazard exposure as follows:

- Coastal erosion: areas that may be prone to erosion in a 1% AEP* event.
- Storm tide inundation: an area that may be prone to temporary inundation from a 1% AEP storm tide event.
- Permanent inundation due to sea level rise: areas that may be prone to regular or permanent inundation by the Highest Astronomical Tide (HAT).

Mapping was prepared for three timeframes:

- Short term (present day to 2030)
- Medium term (around 2050 – and with a 0.3m sea level rise) and
- Long term (2100 – and with a 0.8m sea level rise)

The Queensland State Planning Policy 2017 requires all Councils to plan for 2100 in considering coastal hazards and climate change impacts for strategic land use planning.

By 2100, it is projected that the Queensland coastline will experience a 0.8 m sea level rise and a 10% increase in cyclone intensity.

Sea levels however are projected to continue rising beyond the 2100 planning horizon, emphasising the need for long-term adaptation pathways that accommodate future climate conditions.

*Annual Exceedance Probability (AEP)

The Annual Exceedance Probability is the probability of a storm event occurring in a given year. The defined storm event for Queensland State coastal hazard mapping is a 1% AEP. This means that in any given year there is a 1% (or 1 in 100) chance of that magnitude of event occurring. It does not mean it will only happen once every 100 years – storm occurrence can sometimes be clustered in a series of large storm events over a relatively short period of time, followed by a prolonged period of inactivity. The 1% AEP hazard extents are typically used for planning purposes in Queensland.

Coastal hazard mapping can be viewed **here**.

Coastal hazard modelling was used to assess the risk resulting from coastal hazards to our priority assets, key community values and our natural and urban areas. To determine risk, we followed the below process:

1. MODELLED COASTAL HAZARD EXPOSURE

Coastal engineering experts modelled the predicted coastal hazard exposure to our region based on a set of key assumptions set by the QCoast2100 minimum guidelines.

2. IDENTIFIED ASSETS AND COMMUNITY VALUES

We identified all of Council's assests and land holdings along our coast that are subject to coastal hazard as well as got your feedback on what community values should be considered as part of our strategy.

3. CALCULATED AND MAPPED RISK

Based on the modelling coastal engineering experts calculated the level of risk coastal hazards present now and into the future on our community assets and values. In most cases, it would be expected that low risks can simply be monitored, while high or extreme risks require more immediate action.

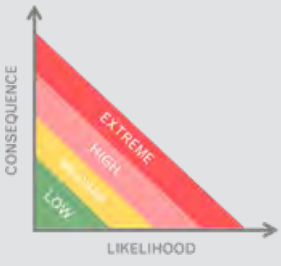
You can view the mapping on Council's **Coastal Futures Website**.

WHAT IS RISK?

RISK is 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).

RISK = LIKELIHOOD OF A HAZARD OCCURRING x CONSEQUENCE OF IMPACT IF IT DOES OCCUR

Risk can be to people's safety, the natural environment, Traditional Owner values, buildings, public infrastructure, private property, community facilities, our places of social and cultural importance and our lifestyle and economic prosperity. Risks can be either direct (e.g. erosion of a beach and foreshore) or indirect (e.g. inundation of a road that isolates a community) and can be assessed across a range from low to extreme. Throughout the project you told us what coastal areas are valued the most and why. We used this information to understand the consequence of coastal hazards as part of the risk assessment.



OUR COASTAL FUTURE: APPROACH TO ADAPTATION

Adaptation Principles, Regional Actions and Local Adaptation Pathways will guide how our community continues to live with a changing coast and the challenges presented by coastal hazards.

Our Adaptation Principles

Adaptation principles provide a foundation for considering the suitability of different adaptation approaches and will guide consistent decision making as part of the implementation of this strategy.

The development of this strategy and its implementation is underpinned by a set of principles and a hierarchy of preferred adaptation approaches.

These principles have been developed from technical findings and community input received as part of our Adaptation Strategies survey in 2020 (587 participants) which provided key insight into what types of adaptation responses you think are acceptable to manage the projected impacts of coastal hazards.

Council's role in adaptation

The management of coastal hazard risk is a responsibility shared with other land managers and private landowners.

Council plays a key role by ensuring public assets are appropriately and sustainably located, designed, constructed, managed and maintained.

Council also supports community resilience to natural disasters and climate change through its legislative roles in land use planning and disaster management.

Considerations for responding to coastal hazards are:

- Financial sustainability and investment equity:
  - » Adaptation can be expensive, and we cannot protect the whole coastline.
  - » We need to focus on low cost solutions wherever we can and prioritise where and when we invest in high cost adaptation responses.
- Protection of high value places and infrastructure:
  - » Our response to coastal hazards should align with what we value.
- Maximising benefits:
  - » When we invest in coastal hazard adaptation, we want to make sure that we maximise community benefits for the region as a whole.

Our key adaptation principles are:

Leading by example, Council will plan for the short and long term effects of coastal hazards on our community assets and infrastructure.

We plan and build for resilience.

Balancing the environmental, social and economic needs of today, without compromising the ability to meet the needs of future generations.

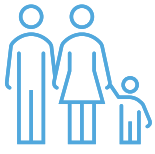
Adapting to change, we make proactive, evidence-based and responsive decisions in a timely manner, informed by changing environmental conditions and community needs.

Enhancing coastline resilience using ecosystem-based approaches such as mangrove and foreshore revegetation.

Protect the function of ecological processes, habitats and biodiversity values.

Prioritising coastal hazard risk mitigation in high risk and high value areas where community benefit is maximised.

High cost infrastructure solutions (e.g. seawalls) for protection of private property will not be funded by Council.



Build community understanding and awareness resilience through signage, events, newsletters and social media.

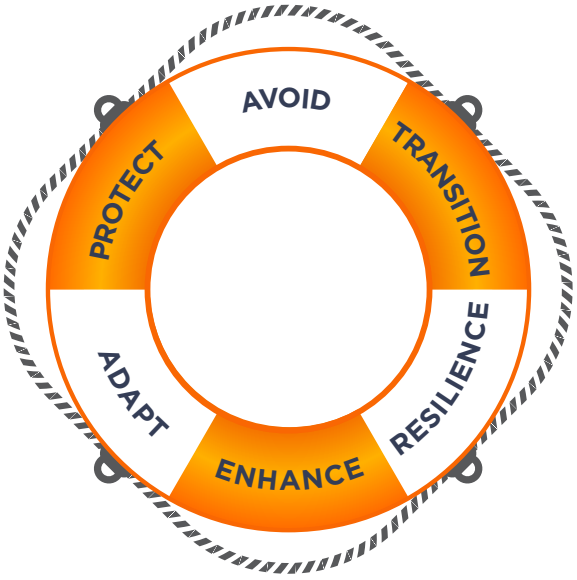
Encourage affected communities to plan for resilience.

Our Adaptation Actions

Adaptation actions have been developed for the region, as well as unique local adaptation actions to support key community values and adequately address the local risk profile.

There are six themes for adaptation actions:

01. **Avoid** building new things in hazard areas.
02. **Transition** existing buildings and infrastructure out of high-risk areas over time.
03. **Build community resilience** through education and community awareness measures.
04. **Enhance coastline resilience** by protecting and/or reinstating natural coastal ecosystems – like stabilising dunes, or revegetating mangroves.
05. **Adapt** existing and future buildings, structures and infrastructure to be able to accommodate coastal changes – building things 'higher and stronger', evacuation planning.
06. **Protect/defend** priority shorelines, localities and infrastructure through the use of beach nourishment, seawalls, levees, groynes or other structures.



Our Adaptation Suite Of Actions

Adaptation actions can be applied to the whole 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 pathways at region-wide and local levels.

AVOID

PLANNING RESPONSE

Implement land use planning responses that are appropriate for the level of risk in the coastal hazard area. These actions build on current planning scheme requirements and may also involve development controls such as coastal setbacks and planning processes such as master planning.

Example: Council could consider density reduction strategy for areas at Extreme and High Risk to restrict land use, particularly for areas subject to erosion and permanent inundation where the impacts can't be mitigated

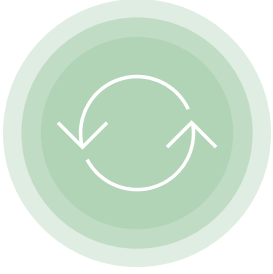
EMERGENCY RESPONSE

Monitoring and early warning systems, including evacuation strategies and community engagement. 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.

TRANSITION

RELOCATE IMPORTANT INFRASTRUCTURE

Planned or managed relocation of assets, infrastructure and buildings to lower risk areas or outside of the coastal hazard extent area. Monitoring will be important to determine when relocation may be socially and economically acceptable.



CONSIDER USEFUL LIFE OF EXISTING ASSETS

Undertaking site-specific and detailed studies which consider the useful life of existing assets to determine the optimal infrastructure solution in regard to coastal hazard and criticality of infrastructure.

COMMUNITY RESILIENCE

COMMUNITY AWARENESS AND EDUCATION

Build community awareness about coastal hazards through wide communication about the Coastal Futures mapping (available from Council's website). Build resilience through education about adaptation.

Example: The Coastal Futures Hazard mapping has been made available interactively so that you can see how coastal hazards affect your property and coastal communities throughout our region now and into the future.

NATURAL ECOSYSTEM STRENGTHENING

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

ENHANCE

MONITOR

Monitoring will inform how risk profiles are changing over time and if adaptation pathway actions are appropriate and effective or need adjusting. Monitoring covers a wide variety of activities and may involve examining beach condition, changes in mangrove and vegetation coverage as well as dune stability

GEOTECHNICAL INVESTIGATION AND DETAILED EROSION STUDY

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

ADAPT

MODIFY INFRASTRUCTURE AND BUILT ASSETS

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

COASTAL ENGINEERING (HARD)

Hard engineering solutions to protect beaches, foreshore and creek front areas from coastal hazards including solutions such as levees, seawalls and groynes.

Example: Rock revetment walls along The Esplanade.

PROTECT

COASTAL ENGINEERING (SOFT)

Soft engineering solutions to protect beaches, foreshore and creek front areas from coastal hazards including solutions such as dune construction and restoration, beach nourishment and beach scraping.

Example: Council regularly undertakes sand pushes along The Esplanade.

ACCEPT THE RISK

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

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

Our Action Plan

Council's Role in Planning for Our Coastal Future

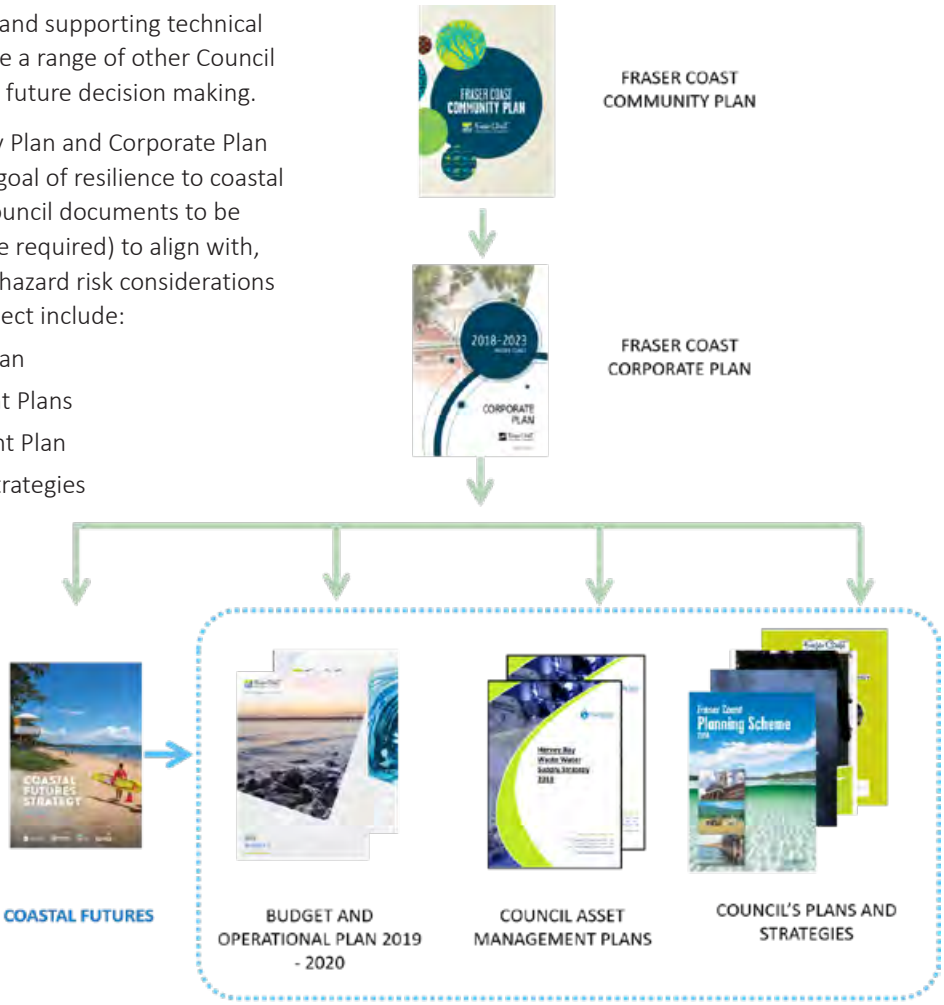
The Coastal Futures Strategy provides an understanding of current and future coastal hazard risks, including how the coast might change or be impacted in the future and what we can do to proactively plan, prepare and respond to these risks over time.

Just like our coastal environment, the Coastal Futures Strategy will evolve as new information, observations and technologies become available. The Strategy will be reviewed at least every 10 years to ensure it aligns with leading practise and community expectations.

The Coastal Futures Strategy and supporting technical work will inform and influence a range of other Council strategies, plans, policies and future decision making.

In addition to the Community Plan and Corporate Plan which directly align with the goal of resilience to coastal hazard risks, the other key Council documents to be reviewed and updated (where required) to align with, integrate and embed coastal hazard risk considerations from the Coastal Futures project include:

- Budget and Operational Plan
- Council Asset Management Plans
- Local Disaster Management Plan
- Other Council Plans and Strategies
- The Planning Scheme



Regional Action Plan

Theme	Action	Detailed Actions
COMMUNITY RESILIENCE	**1. Educate our current and future communities about coastal hazard resilience to:** • Ensure information about coastal hazards is freely available and updated as better information becomes available. • Improve resilience of coastal communities through education and adaptation.	1.1 Make coastal hazard mapping available through Council's interactive mapping portal.
		1.2 Prepare a 'Living with Coastal Hazards' factsheet
		1.3 Prepare an interactive flood and storm tide mapping portal.
		1.4 Run a pilot program with landowners to identify opportunities to improve property resilience to coastal hazards. An example could include working with Smart Cities Flood Resilient Homes Program to develop a program for resilience to coastal hazards.
	2. Monitor our changing coastline to: • Understand how coastal hazards and their impacts change over time. • Recruit residents and visitors to monitor our changing coastline at public monitoring sites. • Obtain information and data for use and sharing by Council and the community.	2.1 Continue Council's formal coastal monitoring program to record changes to dune profile and beach elevation, including regular (at least annual) beach profile surveys. Ensure findings are made publicly available.
		2.2 Establish a program, potentially based on former Beach Protection Authority Coastal Observation Program Engineering (COPE) methods supplemented with recent technology such as a Pilot CoastSnap at the Urangan Pier. Refer to: https://www.coastsnap.com
		2.3 Investigate the installation of permanent tide gauges and wave buoys to be operated by the State Government.
	3. Prioritise and prepare erosion studies and geotechnical investigations to: • better understand coastal hazard processes. • review how effective adaptation options are over time. • support engineering planning and design studies.	3.1 Collate existing information from previous design studies and identify key locations where additional information is needed.
		3.2 Prepare a Prioritisation List for future erosion studies and geotechnical investigation.

Regional Action Plan

Theme	Action	Detailed Actions
ENHANCE	**4. Undertake coastline rehabilitation by:** • Utilising a nature-based approach to beach, dune and foreshore management to maintain beach width and improve shoreline stability.	4.1 Develop and implement program focused on community education about dune management.
		4.2 Expansion of the Natural Environment Program, focusing on community education and long-term restoration projects for improved dune condition and resilience.
		4.3 Define dune management standard treatments. Prepare guidelines to address matters, including but not limited to, vegetation management, sufficient pedestrian access e.g. beach access path to cater for certain catchment of residents. Treatment may vary by location.
		4.4 Establish a program for dealing with illegal encroachment into the foreshore reserve and unlawful vegetation clearing.
		4.5 Reiterate Council's position that sand extraction should be permitted for coastal protection works by Council as part of the Great Sandy Strait Marine Park Review; Monitor the outcomes of the Great Sandy Strait Marine Park Review.
		4.6 Service level review of coastal access tracks.
AVOID	**5. Update Council's land use planning framework and provisions to identify and address coastal hazards.**	5.1 Update the Fraser Coast Planning Scheme storm tide mapping with mapping developed for the Coastal Futures project.
		5.2 Review policy relating to raising of land as a response to storm tide inundation and sea level rise.
		5.3 Undertake a fit-for-purpose risk assessment for land use planning.
		5.4 Embed risk-based approach to land use planning into policy and provisions.
		5.5 Update the Defined Storm Tide Levels (DSTL) in areas affected by storm tide inundation to mitigate the impacts of a storm tide event.
		5.6 Advocate for Erosion Prone Areas and coastal building lines to be updated by the Queensland Government across all urban and future urban areas affected by coastal erosion, to ensure that future development is set back from coastal erosion impacts.
ADAPT	**6. Recognise that emergency response and disaster management is everyone's responsibility by:** • Embedding the findings of the Coastal Futures project in Disaster Management planning	6.1 Review and update the *Fraser Coast Local Disaster Management Plan* with updated coastal hazard mapping.
		6.2 Embed risk outcomes in emergency management and response planning.

Theme	Action	Detailed Actions
TRANSITION	**7. Ensure the strategy actions are:** • embedded, funded and resourced in Council's Corporate Plan and Operations Plan. • Reported on to monitor progress.	7.1 Consider resourcing as part of Council's Service Level Review to progress the strategy actions.
		7.2 Coordinate and report on implementation of the Coastal Futures Strategy for an initial 3-5 year period.
		7.3 Embed consideration of coastal hazards into asset management planning, corporate project planning and Council's service level review. Update necessary policies, procedures and reporting templates. Where relevant, reference coastal hazards in asset management plans.
		7.4 Undertake a review of the Long-Term Capital Works program to determine if asset upgrades/renewals require revision in response to the coastal hazard mapping.
		7.5 Update Council's Flood Study Standard Scope document to include coastal hazards (storm tide inundation, permanent inundation due to sea level rise) to ensure the permanent and temporary effects of 'coastal flooding' are considered as part of future flood studies.
		7.6 Undertake a study to understand exposure to an increased frequency of nuisance flooding due to rainfall and sea level rise for Great Sandy Strait communities.
		7.7 Undertake long term financial planning for coastal protection activities, maintenance, upgrades and renewal, accounting for 'trigger points' for action. Maintain procedures for recording and reporting on coastal protection expenditure.
PROTECT	**8. Maintain existing seawalls, groynes and other structures constructed on public land and where protecting high value public assets.**	8.1 Refer to Locality Actions for individual localities.
		8.2 Establish a Decision Framework and Priorities List for coastal protection maintenance works, upgrades and asset renewal.
	9. Review Council's position on contribution and cost recovery for coastal protection works.	8.3 Review Council's *Shoreline Erosion Protection Structures - Contribution and Cost Recovery Policy*

OUR LOCAL ADAPTATION PATHWAYS

Each locality within the region is different and requires unique adaptation actions to support key community values and address the locality risk profile.

This is why our strategy has considered the local implications from coastal hazards and the need for local adaptation pathways. The identified local adaptation pathways provide an indicative, sequenced approach to the implementation of adaptation actions.

This is necessary to account for the uncertain nature of coastal hazards and to ensure the efficient allocation of finances and resources. These may change over time and will be considered as part of future reviews of this strategy and ongoing community conversations about coastal hazard risks and adaptation responses.

How to read the Local Adaptation Pathway graphs

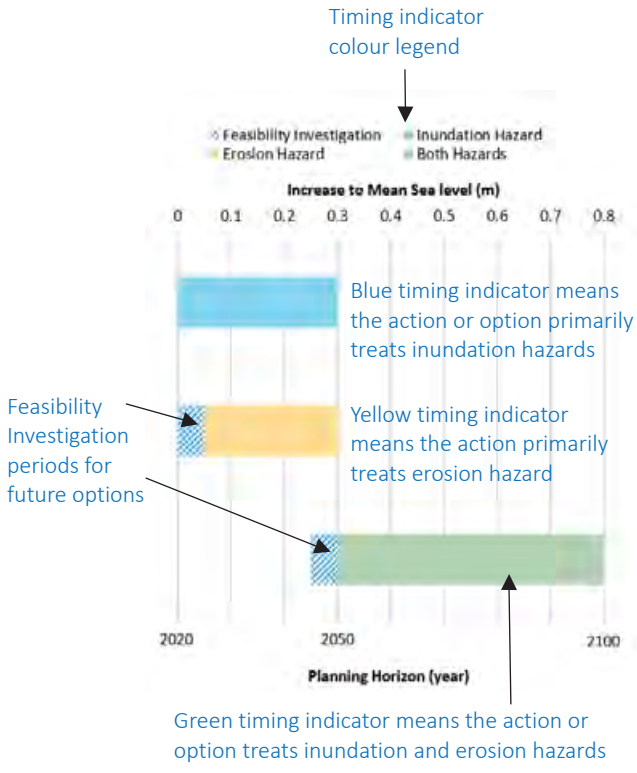
The graphs in the following pages represent the local adaptation pathways supported by the Strategy.

The timing for an action is linked to increases to mean sea level based on sea level rise projections and planning horizons recommended by the State Government for planning purposes.

The indicator starts at 0m increase to mean sea level (or the year 2020) when an action has already commenced and is part of Council's ongoing coastal planning and management activities.

Many options are proposed to commence in the future once an increase to mean sea level has been observed. In these cases, the indicator starts at the approximate time when the option should be considered further.

The indicator may also show a Feasibility Investigation period, this might include time needed for negotiation with the State Government, consultation with the community and stakeholders, planning and design, obtaining relevant State and Commonwealth approvals and/or seeking funding.



A Note On K’gari

K’gari (Fraser Island) is a regionally significant locality but is not a focus of coastal hazard adaptation planning for Council since it is managed differently to other coastal areas, and through other projects and processes.

As a result, potentially vulnerable assets at K’gari have been identified as part of the Coastal Futures project but coastal hazard adaptation planning for K’gari has not been completed for the following reasons:

- The QCoast2100 program is focussed on coastal hazards and adaptation planning, particularly for built or Council-controlled assets and areas.
- Whilst parts of the eastern coastline of K’gari are likely to be subject to some erosion and storm tide hazards out to 2100, the K’gari communities are generally located behind significant dunes or are protected by rocky outcrops and therefore the risks associated with coastal hazards are generally low.
- Whilst some foreshore parks are Council-controlled, K’gari is set within a National Park. This means its management structure is complex and direct intervention to manage coastal hazard risks is unlikely to be supported, other than to relocate potentially vulnerable built assets.

Snorkelling, Wathumba Creek

BURRUM HEADS & SURROUNDS

This Burrum Heads and surrounds local adaptation pathway covers the suburb of Burrum Heads as well as the adjoining suburbs of Burrum River, Beelbi Creek, Burrum Town, Torbanlea, Howard, Cherwell and Pacific Haven.

Burrum Heads is a traditional and popular coastal holiday village that supports a relaxed coastal lifestyle and includes seaside caravan parks and holiday houses, recreational boating facilities and small businesses. Separated by 3km from the main settlement, residential estates are also located on the Hervey Bay frontage.

Cherwell, Burrum River and Beelbi Creek are predominately rural and contain allotments adjacent to either the Cherwell and Burrum Rivers or Beelbi Creek.

Pacific Haven is bordered by the Cherwell and Burrum Rivers and is predominantly rural residential. The area fringing the rivers is low-lying and vulnerable to flooding.

The settlements of Burrum Town, Torbanlea & Howard border the Burrum River, and are located on the Bruce Highway (and Old Bruce Highway). The area contains rural, rural residential and low density residential development with a small commercial area in Howard.

A section of the Burrum Coast National Park occupies more than half of this locality.

The beaches adjacent to residential development are highly valued by the local community, with holiday visitation high close to the Burrum River mouth.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline and river system, fishing and water habitats as well as swimming and fishing opportunities, boat access, camping and small village feel.

Adaptation

Adaptation options that were suggested included:

- Stabilise and protect foreshore areas by re-establishing native vegetation buffers with Sirenia Beach and Beach Drive as key locations to implement natural protection measures.
- Having stronger regulation of clearing vegetation along the foreshore.
- Ensuring no new development in vulnerable areas.
- Accommodating hazards through changes to building design.
- Protecting through maintaining existing seawall structures.
- Retreating by relocating vulnerable houses and businesses.

Our Findings

Coastal hazard risks are primarily related to erosion and sea level rise with impacts to vegetated foreshore areas, buildings, and infrastructure.

Burrum Heads

Intolerable risks within this locality mainly occur around the community of Burrum Heads, with the number of properties at risk increasing significantly between the 2050 (medium term) and 2100 (long term) future climates.

Long term, a large number of low density residential land parcels are at high or extreme risk from sea level rise,

Coastal hazard mapping can be viewed **here**.

and extreme risk from erosion. Two properties in the local centre zone have identified as being at extreme risk from erosion and high risk from storm tide and sea level rise by 2100.

Future erosion risks to land-based assets are reduced if existing seawalls are maintained and upgraded over time.

Important assets at risk include:

- The open coast beach and adjacent foreshore reserves.
- Traviston Park (high risk from sea level rise by 2050).
- Boat ramp facilities (high risk from sea level rise and extreme risk from erosion under all climates).
- Lions Park (high risk from sea level rise by the 2050 climate, however noting the elevation data was captured prior to the substantial redevelopment of the site).
- Burrum Heads Fire Station (high risk from storm tide under all climates).
- Burrum Heads Library (medium risk from storm tide under all climates).
- Several roads including. Burrum Heads Road; Ross Street and Riverview Drive.
- Proposed water storage infrastructure.
- Sewerage pump stations.

Additionally, the Burrum Heads Beachfront Tourist Park site is at medium risk from erosion and storm tide from 2050 onwards, and medium risk from sea level rise by 2100.

Outside of Burrum Heads

The suburbs surrounding Burrum Heads are at high and extreme risks from all hazards under all climates, particularly relating to inundation of rural or rural residential properties at Beelbi Creek, Burrum River, Cherwell, Howard and Pacific Haven.

Except for Beelbi Creek, this elevated risk rating is generally associated with significant inundation depths along the river frontages. More than 90 rural or rural residential properties are within the present climate tidal extent.

The number of rural and rural residential properties at high or extreme risk from sea level rise nearly doubles by 2050.

Analysis of Adaptation Options

In addition to the regional actions (see Regional Action Plan above), targeted refurbishment and upgrade of the existing seawalls will be required to protect public areas. This investment is expected to deliver net benefits to the community and visitors. Preparing to transition some community infrastructure may also be required in the future. Council will continue to advise the land and/or floor levels required to avoid storm tide and sea level rise hazards as part of development approval. The continued raising of land may not be sustainable in the future and will need to be reviewed in the short to medium term.

Access to sand for beach nourishment at this location is currently restricted by the Marine Park Zoning and declared Fish Habitat Area. Negotiations with State Government and changes to legislation are required to overcome this constraint.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Key regional actions for Burrum Heads and surrounds include:

- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.

Maintain road network: sections of roads potentially exposed to coastal hazards include Bushnell Road, Burrum Heads Road, Orchid Drive, Ivor Drive, Riverview Drive.

Reduce intensity of future development: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks.

Hazard resilient design for new/upgraded public infrastructure: design is to be resilient or able accommodate coastal hazard impacts.

Raise land and/or floor levels: requirements to avoid storm tide flood hazards to be set by Council as part of development approval.

Beach scraping and small scale beach nourishment: this action is currently restricted by State Government environmental Marine Park Zoning and declared Fish Habitat Area. If access to sand can be negotiated and approved by the State Government, priority areas would include parks or to protect other public assets.

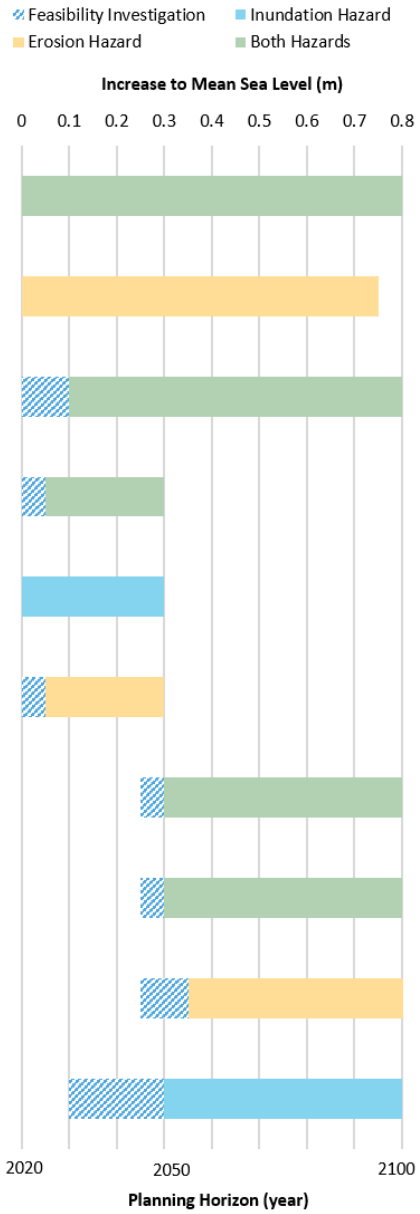
Groynes to complement beach nourishment: this action is to maximise the benefit of beach nourishment and would be further investigated if access to sand was approved by the State Government.

Long-term options

Large-scale beach nourishment: this action is not currently viable due to State Government Marine Park Zoning and declared Fish Habitat Area. This action would be further investigated if access to sand was approved by the State Government.

Seawall refurbishment or upgrades: existing seawalls that protect public areas and assets from erosion may require upgrades to mitigate future coastal hazards. The need for these works would be informed by engineering condition assessments.

Relocate public assets and infrastructure when upgrading: assets including sewerage pump stations, the Burrum Heads Fire Station, and proposed water storage are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Burrum Heads

TOOGOOM

Toogoom is situated between Beelbi Creek and O'Regan Creek. The area is characterised by a stretch of residential development adjacent to the ocean, bordered by wetlands, tributaries, and the Vernon State Forest to the south. The low-density residential areas accommodate a population of approximately 2,200 people.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline and creeks, fishing and wader habitats as well as swimming and fishing opportunities and boat access.

Adaptation

Adaptation options that were suggested included:

- Planning controls should avoid new development in areas subject to coastal hazard risk.
- Enhance shoreline resilience through natural measures such as mangrove and foreshore revegetation.
- Beelbi Creek and O'Regan Creek are key locations to enhance and protect through natural measures.
- Fixter Park is a key asset to protect and enhance through revegetation.
- Relocation of existing public assets from at risk areas.
- Identify and deliver an alternative to Pialba-Burrum Heads Road as an emergency evacuation route for Toogoom.
- Build community resilience through education.

Our Findings

Coastal hazard risks are primarily related to erosion and sea level rise with impacts to vegetated foreshore areas, buildings, and infrastructure.

The majority of properties impacted by coastal erosion and storm tide inundation are at low and medium risk regardless of climate. Long term, the number of low density residential land parcels at high or extreme risk from sea level rise increases.

Important assets at risk include:

- The open coast beach and adjacent foreshore reserves.
- The local road network (most streets in Toogoom are affected by 2100).
- Toogoom Landfill is impacted by storm tide inundation under the 2050 and 2100 climates.
- Sewer infrastructure at Toogoom is impacted by storm tide and erosion hazard extents under all climates.
- Water and stormwater assets.
- Toogoom Rural Fire Brigade Station is impacted by storm tide inundation under the 2050 climate.

Coastal hazard mapping can be viewed **here**.

Analysis of Adaptation Options

In addition to the regional actions (see Regional Action Plan above), targeted refurbishment and upgrade of the existing seawalls will be required to protect public areas. Some public assets may need to be relocated when upgrades are required, or the assets are exposed to intolerable risk.

Undertake a local-scale Shoreline Erosion Management Plan (SEMP) is needed to investigate and plan for ongoing erosion issues at Toogoom Spit and the Beelbi Creek mouth.

Council will continue to advise the land and/or floor levels required to avoid storm tide and sea level rise hazards as part of development approval. The continued raising of land may not be sustainable in the future and will need to be reviewed in the short to medium term.

Access to sand for beach nourishment at this location is currently restricted by the Marine Park Zoning. Negotiations with State Government and changes to legislation are required to overcome this constraint.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Key regional actions for Burrum Heads and surrounds include:

- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and unlawful vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.

Shoreline Erosion Management Plan: a local-scale SEMP is needed to investigate and plan for ongoing erosion issues at Toogoom Spit and the Beelbi Creek mouth.

Maintain road network: sections of roads potentially exposed to coastal hazards include Toogoom Road, Lorikeet Avenue, O'Regan Creek Road, Pialba-Burrum Heads Road (O'Regan Creek Crossing).

Reduce intensity of future development: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks.

Raise land and/or floor levels: requirements to avoid storm tide flood hazards to be set by Council as part of development approval.

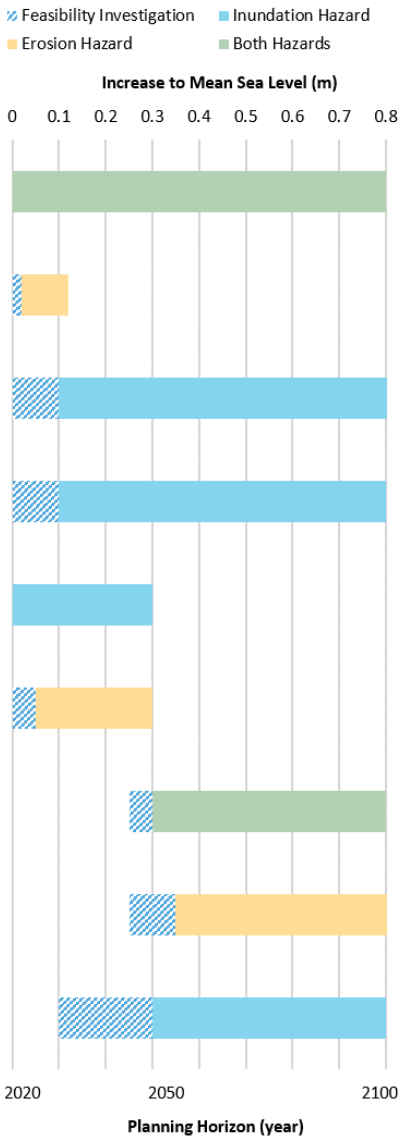
Beach scraping and small scale beach nourishment: this action is currently restricted by State Government environmental Marine Park Zoning. If access to sand can be negotiated and approved by the State Government, priority areas would include parks or to protect other public assets.

Long-term options

Large-scale beach nourishment: this action is not currently viable due to State Government Marine Park Zoning. This action would be further investigated if access to sand was approved by the State Government.

Seawall refurbishment or upgrades: existing seawalls that protect public areas and assets from erosion may require upgrades to mitigate future coastal hazards. The need for these works would be informed by engineering condition assessments.

Relocate public assets and infrastructure when upgrading: assets including the Toogoom Rural Fire Brigade, Toogoom boat ramp and jetty, and Fixter Park are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Toogoom

CRAIGNISH, DUNDOWRAN, ELI WATERS & SURROUNDS

This local adaptation pathway covers the suburbs of Craignish, Dundowran, Dundowran Beach, Eli Waters, Takura and Walligan.

Craignish, Dundowran Beach and Eli Waters extend along the coastline, located between Beelbi Creek and Eli Creek. These areas are made up of predominantly low-density residential development with supporting commercial services and community facilities.

Centred around Eli Creek, Eli Waters is a largely residential area, supported by retail and occasional tourist accommodation. Residential development has incorporated the low-lying areas adjacent to the Creek into inter-tidal exchange lakes. There are development approvals for land between Eli Waters and Dundowran Beach.

Walligan is bordered by Takura and Dundowran and is a mix of vegetated rural and rural residential land. The area fringing the rivers is low-lying and susceptible to flooding.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its natural environment including the coastline, creeks, wader habitats and Mungomery Vine Forest Reserve. The coastal areas support a range of activities including fishing, swimming, camping and horse riding.

Adaptation

Adaptation options that were suggested included:

- Planning controls should avoid new development in areas subject to coastal hazard risk.
- Preference for natural responses to enhance the resilience of at-risk areas such as foreshore and mangrove revegetation.
- Develop a stronger evacuation plan.
- Relocate public infrastructure.
- Build community resilience through education to the public on the value and management of foreshore vegetation.

Our Findings

The majority of properties impacted by coastal hazards are at low and medium risk regardless of climate. Most existing development is buffered from the open coast by a wide and mostly intact dune system.

Long term, the number of low density residential land parcels at high or extreme risk from sea level rise and storm tide inundation increases. There are a number of large areas zoned as emerging communities, located within hazard extents. By 2100 it is expected that over 100 ha of emerging community zoned land will be impacted by coastal hazards.

Important assets at risk include:

- The open coast beach and adjacent foreshore reserves.
- The local road network (most streets in Dundowran are affected by 2100).
- Pialba Burrum Heads Road (State controlled) is currently impacted at the crossings of Beelbi and O'Regan Creeks.
- Sewer infrastructure is impacted by storm tide and erosion hazard extents under all climates.
- Water and stormwater assets.

Coastal hazard mapping can be viewed **here**.

Coastal Hazard Exposure Maps

Coastal hazard mapping for these areas can be viewed at: frasercoast.engagementhub.com.au/coastal-futures-planning-our-changing-coastline

Analysis of Adaptation Options

In addition to the regional actions (see Regional Action Plan above), large-scale beach nourishment is a potential option, however further investigation is required to confirm access to nearby sand sources. Access to sand for beach nourishment is currently restricted by the Marine Park Zoning and negotiations with State Government and changes to legislation are required to overcome this constraint.

The risk to existing development along the open coast areas is relatively low due to the vegetated dune buffer. The dune vegetation needs to be maintained and revegetated in some areas where clearing on public land has occurred.

Council will continue to advise the land and/or floor levels required to avoid storm tide and sea level rise hazards as part of development approval. The raising of land may not be sustainable in the future and will need to be reviewed in the short to medium term. Another option for managing future risks is to reduce the intensity of new development.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Key regional actions for Craignish, Dundowran, Eli Waters & surrounds include:

- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and unlawful vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.

Maintain road network: sections of roads potentially exposed to coastal hazards include the State-controlled Pialba-Burrum Heads Road (O'Regan Creek Crossing) and Serenity Drive.

Reduce intensity of future development: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks.

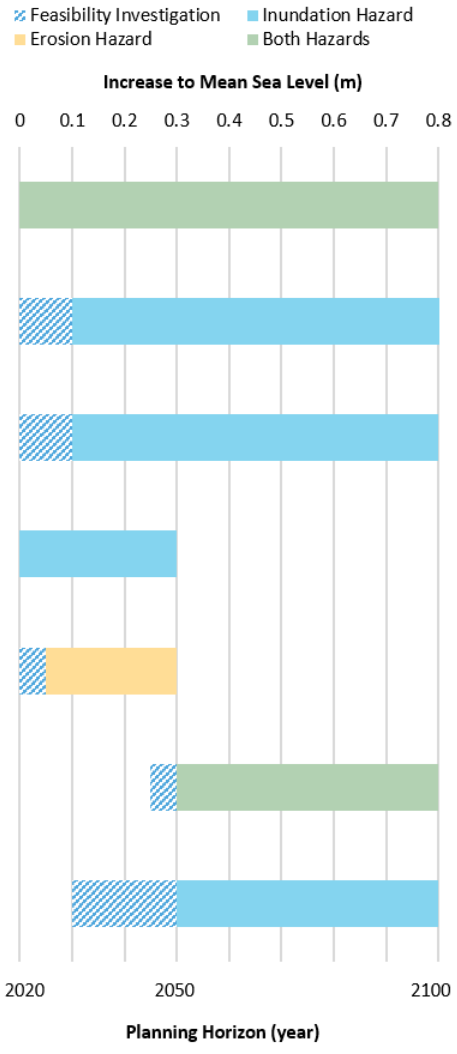
Raise land and/or floor levels: requirements to avoid storm tide flood hazards to be set by Council as part of development approval.

Beach scraping and small scale beach nourishment: this action is currently restricted by State Government environmental Marine Park Zoning. If access to sand can be negotiated and approved by the State Government, priority areas would include parks or to protect other public assets.

Long-term options

Large-scale beach nourishment: this action is not currently viable due to State Government Marine Park Zoning. This action would be further investigated if access to sand was approved by the State Government.

Relocate public assets and infrastructure when upgrading: assets including Whiting Park, small car parts and amenities are exposed to future coastal hazards. Relocating park assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Dundowran Beach

HERVEY BAY ESPLANADE (POINT VERNON TO URANGAN)

This local adaptation pathway covers the suburbs of Point Vernon, Pialba, Urraween, Scarness, Torquay and Urangan.

This extent of coastline includes the most populated and densely developed area of the Fraser Coast region and supports several business centres, including the Hervey Bay CBD. In addition, the area accommodates a range of other uses such as tourist parks, education facilities, open spaces, the Urangan Boat Harbour and Hervey Bay Airport.

Point Vernon and Urangan are made up of predominantly of low-density residential development. Urangan includes several key landmarks such as the Hervey Bay Botanic Gardens, Urangan Pier and Urangan Boat Harbour.

Pialba includes a mix of residential and commercial development. The area also includes community facilities such as Apex Park, Wetside Water Education Park and Hervey Bay Regional Gallery.

Scarness and Torquay include a mix of residential development with hospitality uses concentrated along the Esplanade.

Urraween is located inland and is predominantly made up of low-density residential development. The area includes a number of key destinations including the Stockland Hervey Bay Shopping Centre, Hervey Bay Hospital and St Stephen's Hospital.

What you told us

Coastal Values

The Hervey Bay Esplanade is loved by residents and visitors alike. The Esplanade is one of the most popular areas in the region for recreation, swimming, shopping, dining out, events and tourist accommodation. Users of the area highly value the sheltered beaches, parks and bike paths along the Esplanade as well as the Pier and Torquay Park precinct.

Adaptation

Adaptation options that were suggested included:

- Planning controls should avoid new development in areas subject to coastal hazard risk.
- Enhance shoreline resilience through natural measures such as mangrove and foreshore revegetation.
- Develop a staged relocation plan for development affected by coastal hazards.
- Investigate hard engineering options that do not cause detrimental impacts to the natural environment but provide an appropriate level of mitigation from coastal hazards.
- Protect high priority public infrastructure such as schools, utilities and public open space and recreation areas.

Our Findings

Coastal hazard risks are primarily related to erosion and sea level rise with impacts to vegetated foreshore areas, buildings, and infrastructure.

Currently the range of urban development located along this extent of coastline is affected by coastal hazards at all climates.

Coastal hazard mapping can be viewed **here**.

Long term, the number of properties affected by coastal hazards will increase. Coastal erosion and sea level rise are anticipated to result in a significant number of properties being exposed to high to extreme risk by 2100.

Future erosion risks to land-based assets are reduced if a suitable and maintained seawall is included along the coastline between Scarness to Urangan. Other land parcels are still exposed via estuarine areas such as the Tooan Tooan Creek network.

Important assets at risk include:

The open coast beach and adjacent foreshore reserves.

- The local road network.
- Urangan Pier.
- Jetties at Torquay and Scarness.
- Wetside Water Education Park, Scarness Park.
- Pialba caravan parks.
- Hervey Bay Surf Lifesaving Club.
- Pialba Burrum Heads Road (State controlled) is currently impacted at the crossings of Eli Creek.
- Urangan Boat Harbour.
- Pulgul Wastewater Treatment Plant.
- Eli Creek Sewage Treatment Plant (by 2100).
- Various sewer, water and stormwater assets in addition to the above.

Analysis of Adaptation Options

The area provides significant benefit to the community and further investment is expected in the future. Council actively manages coastal erosion along the Esplanade including seawalls and beach scraping and these activities are expected to continue.

In the future, targeted refurbishment and upgrade of the existing seawalls will be required to protect public areas. Some public assets may be relocated when upgrades are required or the assets are exposed to intolerable risk.

Beach nourishment along the Esplanade is expected to deliver significant benefits to the community and visitors, however the access to sand and the associated costs are uncertain. Currently the Marine Park restricts access to sand for beach nourishment and Council has commenced planning and discussions with the State Government to overcome this issue. Construction of small groynes to maximise the longevity and benefit of beach nourishment campaigns could be considered if large-scale beach nourishment is viable in the future.

Council will continue to advise the land and/or floor levels required to avoid storm tide and sea level rise hazards as part of development approval. The continued raising of land may not be sustainable in the future and will need to be reviewed in the short to medium term.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Maintain road network: sections of roads potentially exposed to coastal hazards include Booral Road and Esplanade.

Reduce intensity of future development: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks.

Development setbacks where freehold land is within the erosion prone area: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks. Council will also advocate for the declared Erosion Prone Area to be updated by the Queensland Government to restrict further development in at risk areas.

Large-scale beach nourishment: this action is not currently viable due to State Government Marine Park Zoning. This action would be further investigated if access to sand was approved by the State Government.

Hazard resilient design for new/upgraded public infrastructure: design is to be resilient or able accommodate coastal hazard impacts.

Raise land and/or floor levels: requirements to avoid storm tide flood hazards to be set by Council as part of development approval.

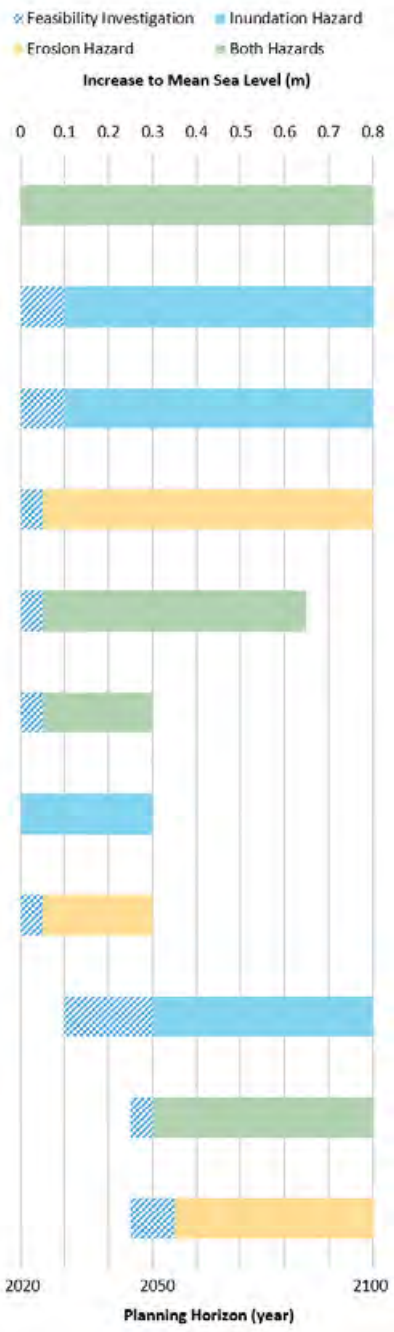
Beach scraping and small scale beach nourishment: this action is currently restricted by State Government environmental Marine Park Zoning. If access to sand can be negotiated and approved by the State Government, priority areas would include parks or to protect other public assets.

Long-term options

Relocate public assets and infrastructure when upgrading: assets including Wetside Water Park, Pialba Oval, Dayman Park, Caravan and Holiday Parks, and Sewerage pump stations are exposed to future coastal hazards. Relocating these assets (or where relevent activities take place) may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.

Groynes to complement beach nourishment: this action is to maximise the benefit of beach nourishment and would be further investigated if access to sand was approved by the State Government.

Seawall refurbishment or upgrades: existing seawalls that protect public areas and assets from erosion may require upgrades to mitigate future coastal hazards. The need for these works would be informed by engineering condition assessments.



BOORAL, RIVER HEADS & SURROUNDS

This local adaptation pathway covers the suburbs of Booral, River Heads, Nikenbah, Sunshine Acres, Bunya Creek and Susan River.

This extent of coastline includes some of the region's rural residential settlements that border the main commercial and residential areas of Pialba, Scarness and Torquay to the north.

Booral is immediately south of Urangan and contains a mix of rural residential lots and vegetated areas.

River Heads is a peninsula-shaped settlement located between the water body of Hervey Bay and the confluence of the Mary and Susan Rivers. A regionally significant boating facility at the tip of the peninsula is used for recreational boating and for daily ferry and vehicular barge services to K'gari (Fraser Island).

Development at River Heads is predominantly rural residential or low-density residential. The majority of residential development is well elevated with views towards K'gari, with the wide inter-tidal area colonised by a mangrove fringe.

Nikenbah is predominantly zoned emerging communities and located immediately south of the existing residential areas of Urraween and Kawungan.

Sunshine Acres is a rural residential development located inland of the coastline, located south of Nikenbah.

Bunya Creek and Susan River are predominantly rural. The downstream portion of Susan River is very low-lying, vulnerable to flooding and is dominated by mangroves.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline and river systems, boating opportunities, access to K'gari via the barge and the Susan River homestead for its good access to recreational activities and the natural environment.

Adaptation

Adaptation options that were suggested included:

- Planning controls should avoid new development in areas subject to coastal hazard risk.
- Enhance shoreline resilience through natural measures such as mangrove and foreshore revegetation.
- Coastal dependent infrastructure should be designed to allow for removal or relocation where possible.
- Land in key locations at River Heads should be resumed by Council and revegetated.
- Hard engineering solutions should incorporate recreational opportunities e.g. walking track along coastline.

Our Findings

Coastal hazard impacts are generally associated with inundation via Hervey Bay and the river systems. Most urbanised areas are elevated above inundation zones, in the remaining areas future erosion hazard extents are largely influenced by sea level rise. All coastal hazards under all climates impact on small areas zoned as low density residential fringing the bay shoreline at Booral and River Heads, and areas of rural residential along waterway frontages in Booral and Sunshine Acres (via Stockyard Creek).

Coastal hazard mapping can be viewed **here**.

Rural land impacts are mainly identified within the localities of Bunya Creek and Susan River, with large land areas impacted under all hazards and climates, including present climate high tide. While approximately half of the impacted land is used for either conservation or wetland purposes, most of the remaining affected land is used for grazing and other rural activities.

Important community assets at risk include:

- The open coast beach and adjacent foreshore reserves.
- Ferry, barge and boat ramps under all climates
- Tourist information centre by 2100.
- Effluent reuse facility (Bunya Creek) by 2100.
- Various sewer, water and stormwater assets in addition to the above.

Analysis of Adaptation Options

In addition to the regional actions (see Regional Action Plan above), public assets may need to be relocated where exposed to intolerable risk or hazard resilient design incorporated into any new projects to ensure infrastructure is resilient to the impacts of coastal hazards. The option to relocate the ferry, barge and boat ramp facilities could be considered in the future as there are relatively few other public assets that require protecting at this location.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.
Key regional actions for Booral, River Heads & surrounds include:

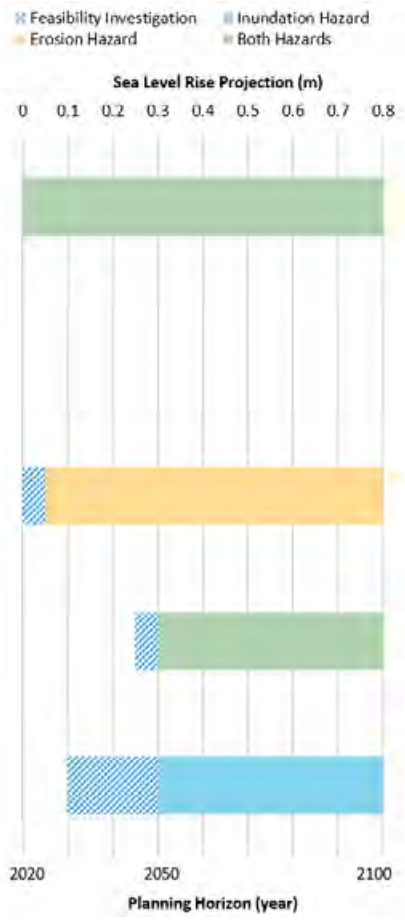
- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and unlawful vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.

Development setbacks where freehold land is within the erosion prone area: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks. Council will also advocate for the declared Erosion Prone Area to be updated by the Queensland Government to restrict further development in at risk areas

Long-term options

Hazard resilient design for new/upgraded public infrastructure: design is to be resilient or able accommodate coastal hazard impacts.

Relocate public assets and infrastructure when upgrading: assets including the barge ramp (State-owned) and boat ramp are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



River Heads

MARY RIVER & SURROUNDS

The Mary River and Surrounds adaptation pathway covers localities adjacent to the tidal extent of the Mary River including Maryborough, Maryborough West, Granville, Tinana, Tandora, Beaver Rock, Prawle, Dundathu, Walliebum, Aldershot, Walkers Point, Island Plantation, St Helens, Tinana South, Bidwill, Oakhurst, Yengarie, Grahams Creek, Ferney, Mungar, Teddington, Owanyilla, Pioneer's Rest, Antigua and Glenorchy.

Set on the tidal reaches of the Mary River, Maryborough is a regional centre built on its rich heritage, traditional manufacturing and cane industries. Maryborough supports several regional government offices and various industries, with significant heritage sites, the central business district and key public facilities located close to the River.

Maryborough and the surrounding localities of Maryborough West, Granville and Tinana all contain low density housing and associated facilities and services, as well as rural areas.

The localities of Tandora, Beaver Rock, Prawle, Dundathu, Walliebum, Aldershot, Walkers Point, Island Plantation and St Helens surround the lower Mary River (and its tributaries) and are mainly rural areas, with pockets of rural residential, marine industries, open space and conservation areas.

Upstream of Maryborough, the Mary River localities of Tinana South, Bidwill, Oakhurst, Yengarie, Grahams Creek, Ferney, Mungar, Teddington, Owanyilla, Pioneer's Rest, Antigua and Glenorchy are predominantly rural.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its 'sense of place' as well as its boating and recreational opportunities.

Adaptation

Adaptation options that were suggested included:

- Accommodating hazards through raising road access.
- Protecting existing erosion protection structures.
- Ensuring no new development in vulnerable areas.
- Retreating vulnerable houses and businesses.

Our Findings

Impacts throughout the area are confined to the fringes of the Mary River and its tributaries, with potential erosion extents associated with estuarine channel migration. Mangrove and saline wetlands dominate the lower portions of the estuary.

As the Mary River has a long history of catchment flooding, most development is elevated and set back from the riverbank. In places where the river channel is very well defined, inundation impacts from sea level rise and storm tide are largely confined within the existing river channel.

The riverfront fringe of numerous residential land parcels along the Mary River and its tributaries are within the present climate high tide extent. This includes low and medium density residential parcels lining the river at Tinana, Granville, and Maryborough, large areas of land zoned as Emerging Communities at Granville and along Saltwater Creek at St Helens, and rural residential parcels at Yengarie and Dundathu.

Coastal hazard mapping can be viewed **here**.

This also applies to the riverfront fringe of parcels zoned as High and Medium Impact Industry, such as the timber mill and industrial recycling facilities in Maryborough.

Coastal dependent land uses, including marine based industries such as boat repairs and premises within the Principal Centre, Low and Medium Impact Industry, Waterfront and Marine Industry and Sport and Recreation zones are impacted by all hazards under all climates.

By 2100, the erosion prone area hazard extent impacts on 183 buildings along the river, most of which are in Maryborough (59), Tinana (31), Beaver Rock (20) and Granville (18). Most of this impact occurs after the 2050 future climate.

Close to Maryborough township low-lying land along the river already exposed to significant riverine flood impacts is zoned as Limited Development (Constrained Land). This area is generally undeveloped.

The remaining impacts are contained within the tidal riverfront fringes of land zoned as rural and open space. Rural land uses within hazard extents are dominated by grazing, with approximately half of all impacted land under all hazards and climates within the locality of Tandora, and major areas within Beaver Rock, Island Plantation and Prawle. Dundathu is also notably impacted under the 2100 storm tide. Land used for sugar is affected mainly within Island Plantation and Prawle under present climate and future hazards, with smaller impacts in most other localities by 2050 high tide. Future storm tide has particularly large impacts on sugar areas at Beaver Rock by 2050 and Walkers Point by 2100.

Upstream penetration of tidal inundation is presently limited by the presence of weirs, in particular Mary River Barrage. The effectiveness of this weir in continuing to limit tidal inundation may reduce over time due to sea level rise.

Community Assets at Risk

- Several roads including the Maryborough Hervey Bay Road, Bruce Highway, Tiger Street and Beaver Rock Road.
- Boat ramps and jetties.
- Queens Park.
- Prickett Aquatic Area.
- Aubinville waste treatment plant.
- Maryborough sailing club and rowing club.

Analysis of Adaptation Options

Coastal hazards are limited to the fringes of most properties adjoining the Mary River. Many land parcels extend across the riverbank and have been identified as being at risk even though there may be no active usage or notable impact to that portion of land.

In addition to the regional actions (see Regional Action Plan above), other options for this area must be considered together with options for mitigating river flood hazards.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.
Key regional actions for the tidal extent of Mary River & surrounds include:

- Expansion of the Natural Environment Program to include riverbank, foreshore and wetland habitat management.
- Council will develop practical guidance for adaptation and riverbank and foreshore protection on private land.

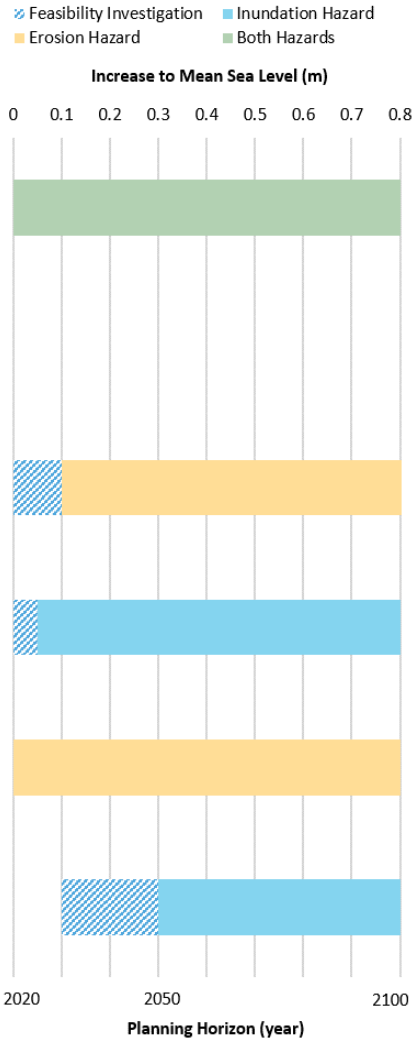
Maintain road network: sections of roads potentially exposed to coastal hazards include Maryborough Hervey Bay Road, the Bruce Highway, Tiger Street and Beaver Rock Road.

Development setbacks where freehold land is within the erosion prone area: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks. Council will also advocate for the declared Erosion Prone Area to be updated by the Queensland Government to restrict further development in at risk areas.

Riverbank refurbishment or upgrades: existing structures that protect public areas and assets from erosion may require upgrades to mitigate future coastal hazards. The need for these works would be informed by engineering condition assessments.

Long-term options

Relocate public assets and infrastructure when upgrading: assets including boat ramps and jetties, Queens Park, Prickett Aquatic Area, Aubinville waste treatment plant, and the Maryborough sailing club and rowing club are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Beaver Rock Boat Ramp

GREAT SANDY STRAIT TOWNSHIPS

The Great Sandy Strait Townships refers to the coastal settlements of Maaroom, Boonooroo, Tuan, Poona and Tinnanbar on the mainland shoreline of the Great Sandy Strait, as well as the surrounding areas of Boonooroo Plains, The Dimonds and Tuan Forest.

The Ramsar-listed Great Sandy Strait was formed by the proximity of the southern half of K'gari (Fraser Island).

The broader area is dominated by vast expanses of protected areas, including Great Sandy Conservation Park, Tuan State Forest and Poona National Park.

The townships are embedded within these protected areas, and are each small fishing villages, Poona being the largest, with a mix of permanent residences and holiday houses. Each settlement supports recreational activities such as boating and fishing, with a formal boat ramp at all settlements. Caravan parks are located at Boonooroo, Poona and Maaroom. Poona and Boonoroo have small convenience stores. Each settlement has small sandy beaches, which are connected along the shoreline by expansive areas of relatively untouched mangroves and salt pans.

For the townships, coastal hazard impacts are generally associated with inundation via the Great Sandy Strait and the local creek systems. Outside of the settlements, which tend to be slightly more elevated, future erosion hazard extents are largely influenced by sea level rise. With the exception of Poona, dunes are largely non-existent. Landforms are very flat and generally low, with foreshore parkland/road reserves separating built assets from the beach.

Vegetation in these areas has been selectively cleared for view lines, but where intact, is able to respond naturally to hazard impacts.

At Poona and Tinnanbar the undeveloped buffer plays an important role in limiting coastal hazard impacts on built development.

Specific findings and coastal hazard adaptation pathways for each township are presented below.

Great Sandy Strait

Coastal hazard mapping can be viewed **here**.

MAAROOM

Maaroom is made up of low-density residential development and camping grounds. The settlement at Maaroom is bordered by the Strait, rural land and vegetated areas. Maaroom is accessible via Granville Road and includes a boat ramp and park facilities adjacent to the water's edge. The residential area accommodates a population of approximately 220 people.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline, fishing opportunities, boat access and the natural environment.

Adaptation

Adaptation options that were suggested included:

- Protecting the foreshore and habitats, including revegetation.
- Accommodating hazards through investigating increased buffers.
- Plan for the relocation of infrastructure.
- Limiting development in at-risk areas.

Our Findings

The central area of Maaroom is the main part of the settlement at risk from coastal hazards.

Seventeen (17) low density residential properties are at extreme risk from erosion by the 2050, increasing to 44 by the 2100. Many of these properties are also at extreme risk from sea level rise by the 2100 future climate. Some rural properties at extreme risk of sea level impacts are heavily inundated under all climates.

Granville Road is at high risk from sea level rise and storm tide by 2100.

The Maaroom Foreshore Reserve and the adjacent narrow beach area are at high risk from erosion and sea level rise by 2100, while the adjacent boat ramp is at extreme risk from erosion.

Analysis of Adaptation Options

The risks from coastal hazards are mainly associated with damage to private property or access to private property. Further development in areas exposed to current and future coastal hazards must be avoided.

In addition to the regional actions (see Regional Action Plan above), pragmatic and practical information to guide adaptation on private land will be developed.

Local Adaptation Pathway

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Key regional actions for Maaroom include:

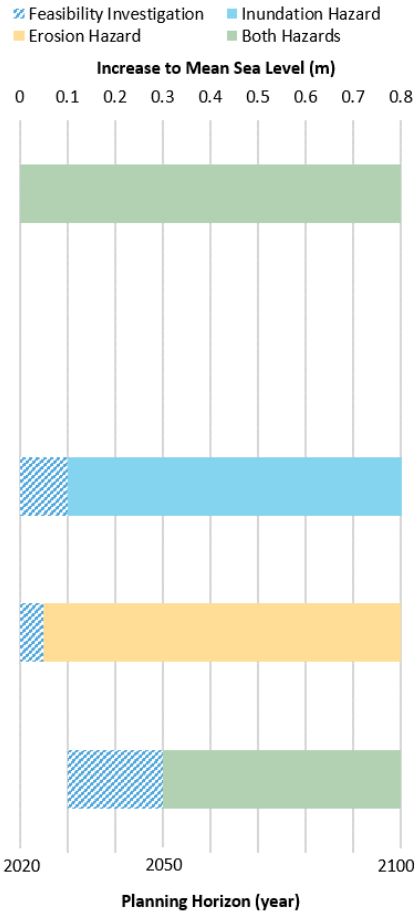
- Assessment of an increased frequency of nuisance flooding due to rainfall, high tides and sea level rise.
- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and unlawful vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.
- Council will develop practical guidance for adaptation on private land.

Maintain road network: section of road potentially exposed to coastal hazards include Granville Road.

Development setbacks where freehold land is within the erosion prone area: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks. Council will also advocate for the declared Erosion Prone Area to be updated by the Queensland Government to restrict further development in at risk areas.

Long-term options

Relocate public assets and infrastructure when upgrading: assets including the Maaroom Foreshore and boat ramp are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Coastal hazard mapping can be viewed **here**.

BOONOOROO & TUAN

The neighbouring settlements of Boonooroo and Tuan are separated by Little Tuan Creek and bordered by the Strait, rural land and vegetated areas.

Boonooroo and Tuan includes several landmarks such as the Boonooroo Sandy Straits Bowls Club, Boonooroo Golf Course and Boonooroo-Tuan Caravan Park. The Boonooroo residential area accommodates a population of approximately 320 people. The Tuan population is smaller at approximately 150 people.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline, fishing opportunities, boat access and the natural environment.

Adaptation

Adaptation options that were suggested included:

- Protecting the foreshore and habitats, including revegetation.
- Accommodating hazards through investigating increased buffers.
- Plan for the relocation of infrastructure.
- Limiting development in at-risk areas.

Our Findings

A substantial portion of the Boonooroo community covering low density residential, rural residential and rural properties are at high to extreme risk from present and future climate coastal hazards. While a small number of properties are already at high risk from tidal inundation under the present climate, nearly 30 residential land parcels are at high or extreme risk from sea level rise by 2050, increasing to nearly 90 parcels by 2100. More than 60 of these are at extreme risk.

Residential land parcels at Tuan are at high to extreme risk from sea level rise and extreme risk from erosion under all climate scenarios, with approximately 100 parcels at risk from erosion by 2100.

The Boonooroo boat ramp facility at Boonooroo Point and the Boonooroo-Tuan Caravan Park are at high risk from sea level rise and extreme risk from erosion by the 2100. The Sandy Straits Coast Guard site is at medium risk from erosion by the 2100 climate. The reserve lining the Tuan foreshore is at high risk from sea level rise under present and future climate scenarios.

Wilkinson Road, the local evacuation route, is at intolerable risk from erosion (all climates) and from sea level rise and storm tide by 2100. Rawson and Eckert Roads are also at intolerable risk from hazards, with Eckert Road at high risk from sea level rise by 2050. Turton Street is at high risk from sea level rise and storm tide by 2100.

Analysis of Adaptation Options

The risks from coastal hazards are mainly associated with damage to private property or access to private property. The local evacuation route is also vulnerable, and maintenance or upgrade of road sections will be required to manage the risk. Further development in areas exposed to current and future coastal hazards must be avoided.

In addition to the regional actions (see Regional Action Plan above), pragmatic and practical information to guide adaptation on private land will be developed.

Undertake a local-scale Shoreline Erosion Management Plan (SEMP) to investigate and address ongoing erosion issues at Boonooroo Point and boat ramp.

Local Adaptation Pathway

Big Tuan Creek, Tuan

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.

Key regional actions for Boonooroo and Tuan include:

- Assessment of an increased frequency of nuisance flooding due to rainfall, high tides and sea level rise.
- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and unlawful vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.
- Council will develop practical guidance for adaptation on private land.

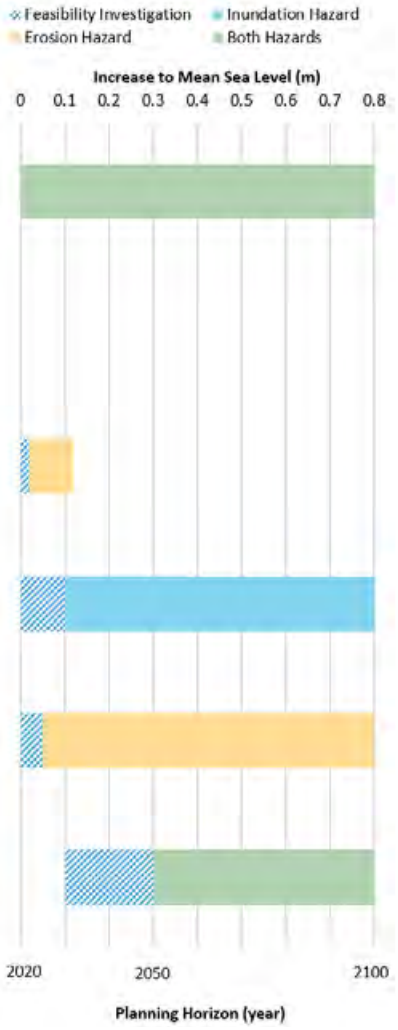
Shoreline Erosion Management Plan (SEMP): a local-scale SEMP is needed to investigate and address ongoing erosion issues at Boonooroo Point and boat ramp.

Maintain road network: sections of roads potentially exposed to coastal hazards include Wilkinson Road, Eckert Road, Rawson Road and Turton Street.

Development setbacks where freehold land is within the erosion prone area: Council's land use planning framework and controls will be updated to identify and address coastal hazard risks. Council will also advocate for the declared Erosion Prone Area to be updated by the Queensland Government to restrict further development in at risk areas.

Long-term options

Relocate public assets and infrastructure when upgrading: assets including the foreshore areas, Boonooroo boat ramp and Boonooroo-Tuan Caravan Park are exposed to future coastal hazards. Relocating these assets may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Coastal hazard mapping can be viewed **here**.

POONA

Poona is the largest of the Great Sandy Strait township and is located along the northern bank of the Poona Creek. The settlement includes several landmarks including the Community Hall and Poona Palms Holiday Park. The residential area accommodates a population of approximately 480 people.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline, fishing opportunities, boat access and the natural environment.

Adaptation

Adaptation options that were suggested included:

- Protecting the foreshore, including revegetation.
- Empowering the community to be resilient through awareness.
- Accommodating hazards through investigating increased buffers.
- Plan for the relocation of infrastructure.
- Limiting development in at-risk areas.

Our Findings

The community of Poona is exposed to high and extreme risks from sea level rise and erosion, with the greatest increase in risk occurring between 2050 and 2100. Areas of higher risk exposure for the community are close to the foreshore north of the boat ramp site, and on the north-western frontage of the community.

By 2100, more than 100 low density residential parcels are assessed as being at high or extreme risk from sea level rise, and at extreme risk from erosion. The foreshore reserve which includes the beach is at medium risk from erosion under all climates.

Boronia Drive is at medium risk from erosion and high risk from sea level rise and storm tide by the 2100.

Analysis of Adaptation Options

The risks from coastal hazards are mainly associated with erosion and sea level rise and impacts to the foreshore area along Boronia Drive. In some areas this has been exacerbated by the removal of native vegetation.

In addition to the regional actions (see Regional Action Plan above), the multiple informal and unapproved shoreline erosion controls along Boronia Drive should be removed or potentially upgraded to an appropriate standard. Pragmatic and practical information to guide adaptation on private land will be developed.

Local Adaptation Pathway

Poona

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.
Key regional actions for Poona include:

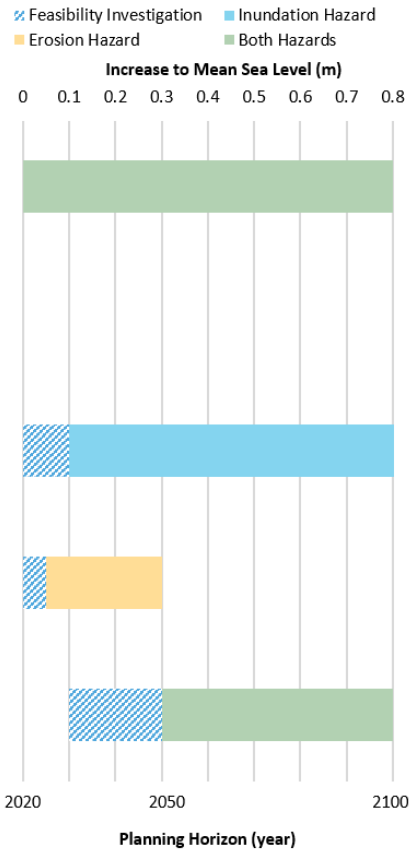
- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and illegal vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.
- Council will develop practical guidance for adaptation on private land.

Maintain road network: sections of road potentially exposed to coastal hazards include Boronia Drive.

Remove or formalise unapproved erosion controls: remove unapproved shoreline erosion controls along Boronia Drive and consider upgrading with appropriate shoreline erosion protection structures.

Long-term options

Relocate public assets and infrastructure when upgrading: Poona Foreshore areas are exposed to future coastal hazards. Relocating assets within this area may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.



Coastal hazard mapping can be viewed **here**.

TINNANBAR

Tinnanbar is located near the southern extent of the Fraser Coast local government area. The township is made up of low-density residential development and bordered by the Strait and vegetated areas. The settlement accommodates a population of approximately 120 people.

What you told us

Coastal Values

Based on your feedback, your key values for this area are its coastline, fishing opportunities, boat access and the natural environment.

Adaptation

Adaptation options that were suggested included:

- Protecting the foreshore.
- Accommodating hazards through investigating increased buffers.
- Plan for the relocation of infrastructure.

Our Findings

There are limited risks to the settlement at Tinnanbar from coastal hazards, with the main risk at the boat ramp site which is assessed as being at extreme risk from sea level rise and high risk from erosion under all climates.

The beach and the foreshore are at high risk from sea level rise and medium risk from erosion under all climates.

No roads or major extents of stormwater infrastructure are exposed to intolerable risks from coastal hazards.

Rural land parcels adjacent to the settlement area are at extreme risk from sea level rise under the present climate, largely as these parcels are already regularly and substantially inundated.

Coastal Hazard Exposure

The exposure to coastal hazards is relatively low, with only limited risks to existing assets development.

Analysis of Adaptation Options

There are limited coastal hazard risks to the existing settlement at Tinnanbar. Regional actions (see Regional Action Plan above) and ongoing maintenance activities as required are expected to deliver satisfactory outcomes.

Local Adaptation Pathway

Tinnanbar

Drawing from your feedback and the technical findings from previous phases of the project, the below adaptation actions provide a guide for us, as to how we address coastal hazards moving forward.

Notes:

1. *Planning horizons are linked to projected increases to mean sea level (or sea level rise) adopted by the State Government and are subject to change in response to publications by the Intergovernmental Panel on Climate Change*
2. *Short-term and long-term options require further detailed investigation and consultation*
3. *Adaptation options will be continually monitored and reviewed in response to changing circumstances*

Ongoing or Short-term options

Regional actions including Planning Response, Emergency Response, Community Awareness and Education, Natural Ecosystem Strengthening, and Monitoring.
Key regional actions for Tinnanbar include:

- Expansion of the Natural Environment Program for foreshore and wetland restoration and habitat management.
- Establish a program to deal with illegal encroachment into foreshore reserve and illegal vegetation clearing.
- Council will develop practical guidance for foreshore adaptation and protection on Council land.

Accept the risk: the present and future coastal hazard risks to existing development at Tinnanbar have been assessed as low. As part of the regional actions, shoreline erosion will be monitored to identify any emerging risks.

Long-term options

Relocate public assets and infrastructure when upgrading: Tinnanbar Foreshore and boat ramp areas are exposed to future coastal hazards. Relocating assets within these areas may be more cost effective than upgrading with a coastal hazard resilient design. Options will be investigated when considering the useful life of existing assets.