

OUR RESILIENT COAST

Isaac Coastal Hazard Adaptation Strategy



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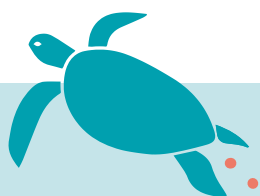
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Isaac Regional Council acknowledges the traditional custodians of the land and waters within the Isaac region, and we recognise their connection to land, waters and community.

Council also recognises those whose ongoing efforts to protect and promote Aboriginal and Torres Strait Islander cultures will leave a lasting legacy for future elders and leaders.



1.0 INTRODUCTION OUR COAST

The Isaac coastline extends over 130 kilometres from St Lawrence through to Cape Palmerston. This stretch is characterised by beach communities and villages nestled along one of the last remaining relatively undeveloped yet accessible stretches of the Australian east coast, attracting travellers and those seeking a relaxed coastal lifestyle.

The Isaac coastal region is made up of four small, discreet coastal communities, sandy beaches with low profile dune systems fronted by broad inter-tidal flats, separated by extensive estuarine wetlands. The region has the largest tidal range on mainland Queensland, with a range in the order of seven metres.

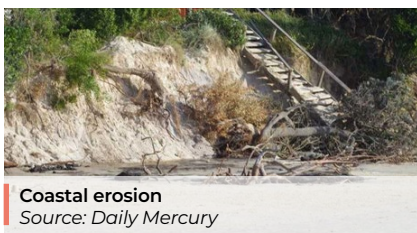
Building the resilience of our coastline is one of our top priorities. To do this we need to understand how our coast is impacted by coastal hazards today and in the future. Understanding current and future coastal hazards, their risks and impact on our community allows us to proactively plan, prepare and respond to them over time.

This strategy provides the strategic direction and priority actions to progress coastal hazard adaptation and proactively supports the whole community building resilience to coastal hazard risks now and into the future



WHY DO WE NEED A STRATEGY?

Our coastal environment is ever-changing, shaped by wind, waves, tide, currents and changing sea levels. Impacts from these natural processes include storm-tide inundation, coastal erosion and sea level rise. Known as coastal hazards, they can affect our region's natural and built environment, our day to day lives, our communities' wellbeing and our economy.



Coastal erosion
Source: Daily Mercury



Storm-tide inundation
Source: The Morning Bulletin, 2016



Sea level rise
Source: Australian Academy of Science

Climate change is the change in the present-day climate due to warming of our atmosphere and oceans. This will influence how and where the coastal hazards of sea level rise, storm-tide inundation and coastal erosion affect our coastal areas.

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

Storm-tide inundation is the temporary inundation of land by abnormally high ocean levels caused by cyclones and severe storms.

Sea level rise is the increase in sea level caused by global warming due to climate change, leading to increased tidal extents and the periodic or permanent inundation of land by the sea.

STRATEGY CONTEXT

Isaac Regional Council received funding under the Coastal Hazards Adaptation Program (QCoast2100). The QCoast2100 program is a state-wide initiative of the Queensland Government and the Local Government Association of Queensland (LGAQ).

The program was designed to assist Queensland coastal local governments to plan for and address climate change related coastal hazard risks. Funding provided under the program was used to prepare the Isaac Regional Council's Our Resilient Coast Strategy.

Our strategy focuses on the four coastal communities, namely Ilbilbie and Greenhill, Carmila Beach, Clairview and St Lawrence, and has been prepared:

- to align with the processes and requirements of the QCoast2100 Minimum Standards and Guidelines for Queensland (LGAQ & DEHP, 2016);
- to proactively respond to the current and future impacts of coastal erosion, storm-tide inundation and sea level rise;
- in partnership with the community and other stakeholders.

PURPOSE

The purpose of the Our Resilient Coast Strategy is to identify coastal hazard risks and provide a long-term plan outlining how we will adapt, manage and increase our resilience to the impacts of coastal hazards, now and into the future.

This strategy outlines the:

- coastal values of the region;
- current and future coastal hazard risks, nominally to the year 2100;
- short, medium and long-term actions to avoid, reduce and adapt to coastal hazard risks;
- recommended approaches to consider in managing our coastline.

This strategy forms the foundation to build the resilience of our coastline for our community.



PROCESS

Strategy development has been underpinned by technical studies and engagement activities. The outputs from this work have:

- Identified existing coastal hazard extents for major coastal erosion, storm-tide inundation and predicted tides, and how these extents might be expected to change in the future under the influence of rising sea levels over different timeframes: present day, medium term (2050 – increase in sea level of 0.3m) and longer-term (2100 – increase in sea level of 0.8m).
- Assessed vulnerability and risks to a broad range of natural and built assets, considering environmental, social, cultural and economic values.
- Identified priorities – distinguishing between urgent risks that need responding to today and risks that can wait.
- Identified adaptation options to treat or manage coastal hazard risks.
- Identified 'tools' to deliver the adaptation options.
- Outlined timing, staging and sequencing of actions over time.
- Defined roles and responsibilities for implementing actions.
- Identified potential funding sources.
- Outlined monitoring and review expectations.

This strategy is the foundation to build the resilience of our coastline for our community.



ENGAGING WITH THE COMMUNITY

Caring for our coast now and into the future is a shared responsibility involving all stakeholders including local, Queensland and Australian governments, Traditional Owners, business owners, property owners, residents and the broader community.

Having a shared vision and framework to underpin the strategy is important. Council has sought to involve the community and a wide range of stakeholders to share the experiences people have had with our changing coast. We asked what they value most about our coastal communities and provide feedback about how we manage our coast now and into the future. This strategy has been developed in consultation with:

- Council representatives (Council staff and Councillors).
- Queensland Government representatives.
- The broader community.

The Technical Working Group and Councillors have provided feedback at key decision points across all project stages.

Figure 1 illustrates the 'touchpoints' for engagement undertaken in developing this strategy.

Community consultation for this strategy was undertaken as part of the hazard and asset identification phase (Phases 3 and 4) (August – September 2020). The engagement was geared to introduce the community to the Coastal Hazard Adaptation Strategy

(CHAS) project and understand local values, special places and assets along the coast. This provided an understanding of the local context to inform the strategy and to ensure community values guided the development of locally appropriate adaptation options for our coastal communities.

The engagement undertaken has built on prior consultation with members of our coastal communities, which was completed when Council prepared the adopted Isaac Region Planning Scheme. The planning scheme engagement activities overlapped with the very early phases of the CHAS project and included a series of workshops and one-on-one meetings with residents and community members from our coastal communities. It provided valuable insights into the community's views on coastal hazards and their management.

The draft Our Resilient Coast Strategy was released for public exhibition and comment between 7 March 2022 to 4 April 2022. The feedback received from this final round of community consultation was reviewed and considered in preparing the final Our Resilient Coast Strategy.

FIGURE 1. CHAS phases and engagement touchpoints

● Engagement 'touch points' with stakeholders and community



STRUCTURE

The strategy is presented over six chapters:

01. INTRODUCTION

Introduces the strategy, context and purpose.

02. OUR COASTAL VALUES

Outlines the values of our coastline we hold dear.

03. COASTAL HAZARDS & RISK

Details what coastal hazards are and what risk means.

04. VISION AND PRINCIPLES

Establishing our vision and the principles which underpin our coastal hazard adaptation actions.

05. ADAPTATION ACTIONS

Presents the short, medium and long-term actions required to appropriately respond to coastal hazard risks now and into the future.

06. IMPLEMENTATION PLAN

Identifies priority adaptation options to treat priority risks over the short-term (5 – 10 years).

2.0 OUR COASTAL VALUES

OUR COASTAL PLACES

The Isaac region has over 130 kilometres of coastline stretching from Ilbilbie and Greenhill in the north, to St Lawrence/Styx River in the south. Our coastline is relatively untouched by urban development and features large estuarine wetlands, beaches, waterways, fish, dugong and turtle breeding areas, islands and is part of the Great Barrier Reef Marine Park, all bound by the Coral Sea.

There are four small coastal townships – Ilbilbie and Greenhill, Carmila Beach, Clairview and St Lawrence – which are dispersed along the coast. Most of the land along the coast consists of rural land or low-lying tidal areas.

Our coastal areas are loved for their inviting sandy beaches, green spaces, connection to nature and the recreational and scenic opportunities they provide us.

Community feedback received as part of this project has helped to understand the values of our coastal communities.

The Isaac region is intrinsically linked to its pristine coastline, scenic coastal landscapes, natural environment and biodiversity values, all of which underpin why people choose to live, visit and holiday in the region. A strong connection to the coast and natural environment is embedded into the culture, identity and values of the region.

OUR COASTAL ENVIRONMENT

Our scenic coastal landscape is characterised by a unique combination of landforms including sandy beaches, estuaries, wetlands, mangroves and mud flats, bays, dunes and offshore reefs with some small islands. Our wetlands, waterways, natural foreshores, beaches, islands and coastal vegetation support a diverse and flourishing ecosystem of plants and animals.

Waterways and wetland areas such as the Styx River, St Lawrence Creek, Clairview Creek, Cattle Creek, Feather Creek, Carmila Creek, Flaggy Rock Creek, West Hill Creek, Marion Creek and St Lawrence (Broad Sound) and their connection to the coast are an essential part of our natural environment and underpin the

health, prosperity and wellbeing of our region. Wetlands are important habitat areas for native fauna and flora. Most of the coastal waters, estuaries, creeks and inlets stretching from Cape Palmerston to Clairview and St Lawrence Creek to the Styx River are identified fish habitat areas. The nationally significant St Lawrence Wetlands form part of the greater Broadsound Wetlands and are listed in the Directory of Important Wetlands in Australia.

There are many important nature conservation areas supporting large extents of protected ecosystems, including West Hill National Park and Clairview Dugong Sanctuary. The coastal waters are part of the Great Barrier Reef Coast Marine Park and are of national and international significance as a World Heritage Listed area.

The relaxed coastal lifestyle and the untouched natural beauty of our coast are reasons why people want to live in and visit our coastal communities. The coastal landscape and natural areas support a variety of places that hold special cultural, environmental and economic values to residents and visitors.

OUR COASTAL ECONOMY

Jobs and the economy are identified as important priorities for the future of the Isaac Region.¹ Mining is the largest industry employer in the region, producing 42% of Queensland's saleable coal.² Agriculture, forestry and fishing is the third largest export industry driving the Isaac economy, with livestock, cropping, fishing and aquaculture facilities accounting for 1.65% of regional exports.

Accommodation and food services is the eighth largest industry sector, generating approximately \$164

million each year.³ The Isaac coast is identified as an emerging tourism precinct for development in the Mackay Destination Tourism Plan. The St Lawrence Wetlands Weekend is held annually in St Lawrence and is promoted as one of the 'must do' events on the Central Queensland events calendar. The three-day festival attracts interstate visitors and provides people with an opportunity to immerse themselves in nature, take a tour of the wetlands and learn about endangered species, watch demonstrations and participate in creative art workshops.⁴ The event attracts large numbers of tourists, many of whom stay in the St Lawrence township over the weekend.

Coastal dependent infrastructure, particularly to support recreational boating and fishing, is important for the local community and the economy and each is a key tourism driver. Each coastal community has camping facilities, which are popular with tourists due to their stunning views, pristine location and/or access to the water. Many of the homes in our coast communities, namely Carmila Beach and Clairview, are holiday homes or holiday rentals for people living within and outside the Isaac region.

How we respond to coastal hazards today and in the future will directly influence the strength of existing businesses, our lifestyle and why people to choose to visit or live on the coast.

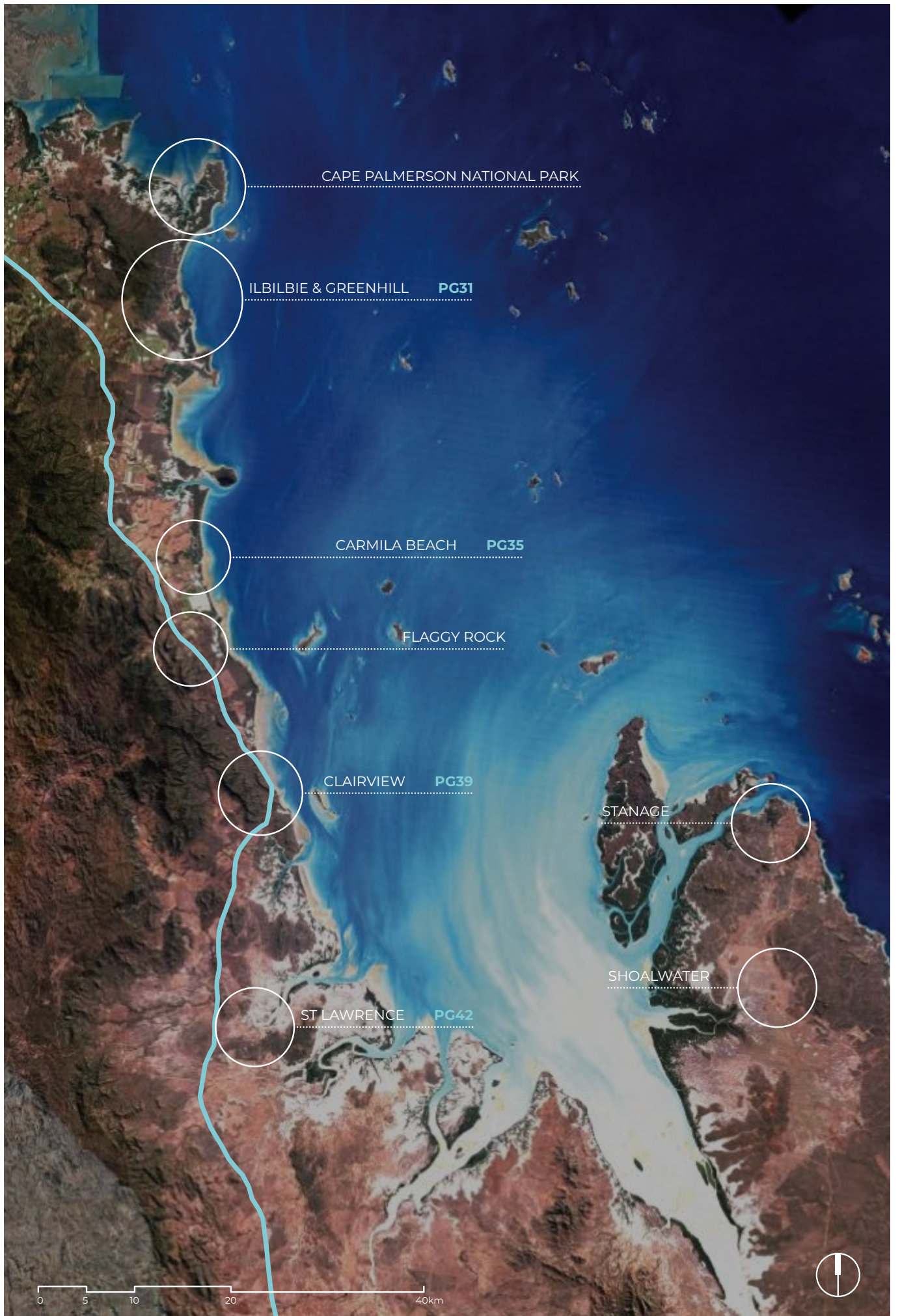
¹ Isaac Regional Council 2035 Community Strategic Plan

² Isaac Regional Council 5 year Corporate Plan 2017-2022

³ REMPLAN, 2021

⁴ Fitzroy Basin Association, 2021

⁵ Gladstone Observer, 2019





OUR COASTAL LIFESTYLE

Inviting sandy beaches, green spaces to enjoy nature and a sense of being near the water are important qualities of our coastal communities.

Residents of and visitors to our coastal communities value easy access to water-based activities like boat ramps and the natural, unspoiled environment that can be enjoyed in and around the numerous waterways and estuaries.

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

Some of our favourite ways to use our coastal places include enjoying the scenic coastal views, boating and fishing. We appreciate the natural coastal environment, connecting with nature and delighting in water or foreshore recreational activities such as walking on the beach, picnicking, camping and four-wheel driving.

OUR FAVOURITE WAYS TO ENJOY OUR COASTAL PLACES INCLUDE⁶:



Recreational activities in the water, along the foreshore and at the water's edge



Scenic views and connecting with the natural coastal environment



Picnics and BBQs with friends and family



Camping close to the water

OUR IDEAL QUALITIES OF THE BEACH OR FORESHORE INCLUDE⁶:



Inviting sandy beaches for recreation



Green spaces where we can enjoy nature and lots of wildlife



A sense of being near the water, with open views of the ocean



Easy access for water-based activities



Facilities for recreation, gathering with family and friends and public amenities

⁶ Data based on Phase 3&4 community survey results

3.0 UNDERSTANDING OUR CHANGING COAST

Our coastal areas are dynamic places that have formed over a long time by natural processes, such as wave and wind action, ocean tides and currents. These natural coastal processes are also known as coastal hazards when they potentially impact on buildings, community infrastructure and our natural areas.

The Our Resilient Coast Strategy focuses on three coastal hazards that affect our coastline

1 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 along the beachfront or inundation of land via waterways, estuaries and drainage lines.

2 COASTAL EROSION

The loss of land, beach or dunes by wave or wind action and tidal currents. Coastal erosion can be short-term or long term, temporary or permanent.

3 PERMANENT INUNDATION DUE TO SEA LEVEL RISE

The regular or permanent inundation from the tidal cycle, including up to the highest astronomical tide. Tidal inundation also influences the extent of land exposed to coastal erosion and storm-tide inundation.

A 0.8m sea level rise by 2100 is currently planned for by the Queensland Government.

The extent of coastal land potentially exposed to coastal hazards, as well as the consequences of these coastal hazards, are expected to increase in the future as sea levels rise. These natural coastal processes, whether occurring daily or from more extreme weather events, have always impacted and shaped our coast.

Coastal hazards and their impacts – experienced past and present – will continue in the future and are part of living on the coast. How we have experienced past coastal hazards and how we choose to respond in the future will change over time. Managing and improving our resilience to coastal hazards is a continual journey for everyone and it is important we build on what we have learned works well for our region and our communities.

Climate change is expected to increase the extent, severity, and frequency of coastal hazards. For example, tropical cyclone behaviour is expected to alter and a greater extent of low-lying land will be affected by normal tidal inundation under rising sea levels.

One of the best lines of defence to protect our coastal infrastructure and valued places from coastal hazard impacts, is our natural environment – a wide beach, healthy dunes, healthy coastal vegetation, and intact habitats which provide a protective buffer. These are also the qualities and features that our community values most on the coast.

We can expect to see a range of changes to our coast from coastal hazard impacts in the short and long-term.



Storm-tide inundation
Source: *The Morning Bulletin*, 2016



Coastal erosion
Source: *Daily Mercury*



Permanent inundation
Source: *Australian Academy of Science*

WHAT ARE THE COASTAL HAZARDS AFFECTING OUR COAST?

This strategy is forward-looking and considers coastal hazards to 2100 (with 0.8m sea level rise). Coastal hazard extent mapping has been prepared for three timeframes:

- short-term (present day),
- 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 coastal hazard mapping indicates how coastal hazard extents may potentially change over time under the influence of sea level rise. The mapping also supports monitoring impacts and changes over time, preparing for change and making informed decisions about growth, development and investment on our coast.

Queensland's *State Planning Policy 2017* requires all Councils to adopt a timeframe of the year 2100 to account for climate change impacts in its strategic land use planning. The policy adopts a scenario of the Queensland coastline experiencing a 0.8m sea level rise and a 10% increase in cyclone intensity.

The climate change projections for sea level rise in the *State Planning Policy 2017* and therefore this strategy is based on the recommendations from the Intergovernmental Panel on Climate Change (IPCC). Council will update the coastal hazard mapping as new and updated climate science and policy becomes available.

The coastal hazard risks to our coastal communities will increase over time. Some parts of our coastal communities are already vulnerable to coastal erosion. The risk of exposure to coastal erosion is expected to become more widespread in some areas or intensify as sea levels rise.



HOW MAY THESE CHANGES IMPACT US?

We all have special places, features, qualities or memories of the coast that are important to us for varied reasons – economic, social, environmental, cultural or personal. These places are at risk when coastal hazards threaten to impact them.

Our coastal hazard risk today will be different to our future risk. For example, an area not exposed to coastal hazards today may be exposed in the future, therefore the risk to that area increases over time.

This is true for important locations such as Carmila Beach village area, Cape Palmerston Holiday Park and BarraCrab Caravan Park which are not at notable risk from erosion or sea level rise today but are expected to be at a higher risk in the future (in 2050 and 2100).

To identify risk along our coast, we need to first understand the impact of coastal hazards, including how much it affects and what the impacts are on our special places and important infrastructure. We understand this by looking at our special places, land uses, communities and public infrastructure and how exposed they are to potential coastal hazard impacts. This is undertaken from a social, economic and environmental perspective:



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



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



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

The above elements help us to better understand the effects of coastal hazards. They explain the degree of impact to our community, economy and environment should a coastal hazard event occur. The scale and timeframe of the social, economic or environmental impact are also important. The value we place on the parts of the coast affected, how sensitive we are to impacts and how we cope with these impacts are considered in our overall risk.

To understand the potential impacts of coastal hazards in the Isaac Region and what infrastructure and areas are exposed to coastal hazard risks today and into the future, a technical analysis was undertaken of:

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

A small portion of our region's total existing urban area is expected to be impacted – with less than 1% being exposed to coastal hazard risks in the future. Most of the land exposed to coastal hazards is within the rural zone.

The changes to coastal hazards over time mean our community and open space areas – like our foreshores and parks – will become more exposed to coastal erosion and storm-tide inundation because they often co-locate on the coast to take advantage of natural values.

Our conservation and environmental areas are also increasingly exposed to coastal hazards over time. Erosion and storm-tide inundation is expected to affect these areas more than sea level rise. This will have implications for our coastal habitats and how we manage and care for these areas.

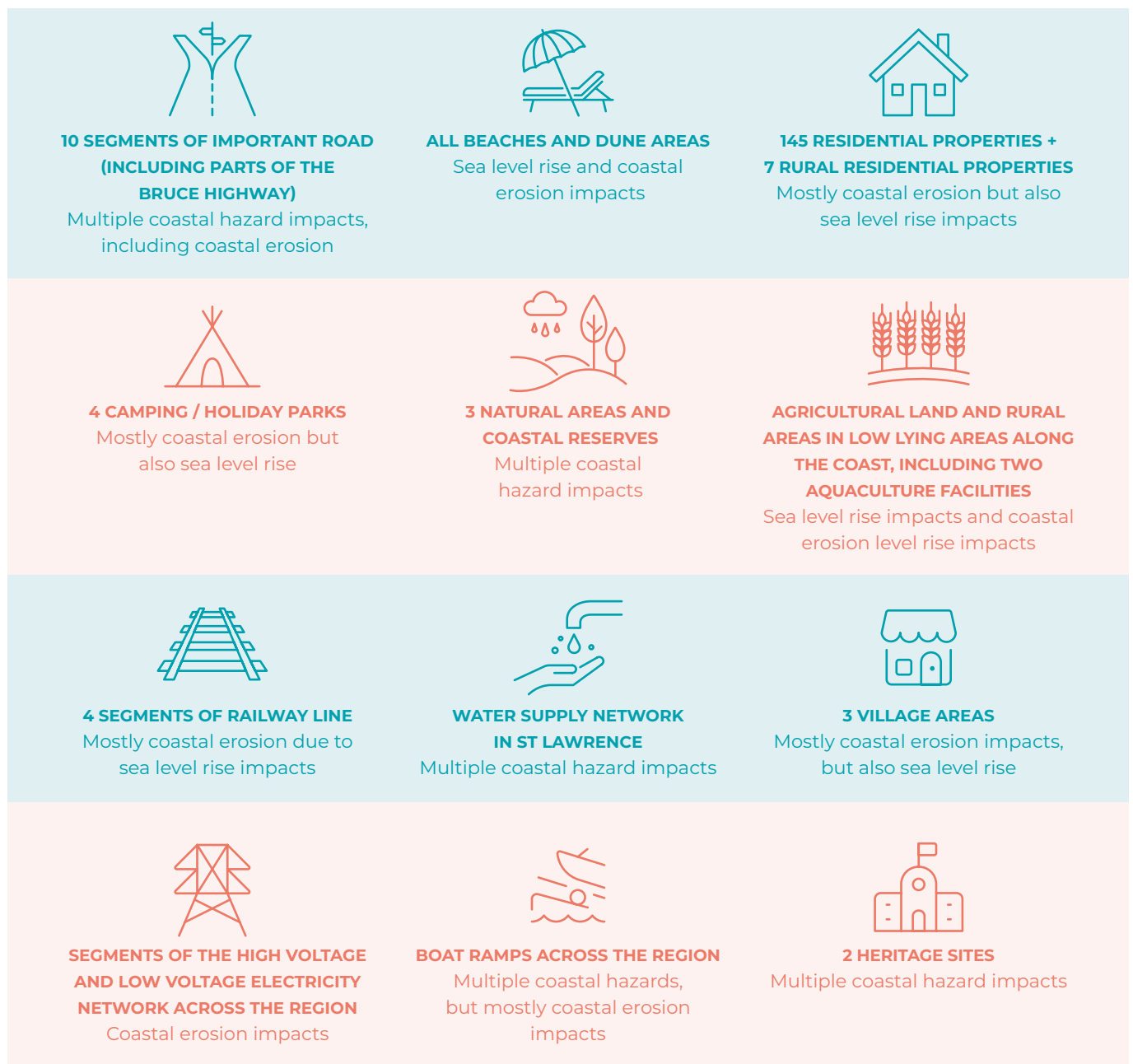
The coastal locations of our villages make them more exposed to coastal hazards over time. Outside of our coastal villages, there are large rural land holdings along the coast that will be vulnerable to coastal erosion, sea level rise and storm-tide inundation by 2050 and 2100.

A technical risk assessment for the whole of the Isaac region identified the following special places and important infrastructure at high or very high risk at present day, by 2050 or at 2100:

High and extreme risks are associated with:

- Erosion along the open coast
- Inundation from sea level rise and associated erosion in estuarine areas

Storm-tide inundation is a lower risk due to rarity of occurrence and the temporary nature of these events. Determining which risks to treat is informed by Council and the community's tolerance to risk.





RISK ASSESSMENT

BEING RISK AWARE

A key concept at the centre of this strategy is 'risk'. To ensure we are able to adapt and respond to coastal hazards as they occur in our region, it is important we plan for the varying level of risk that these hazards will have in our community. Risk allows us to understand the **likelihood** and **consequence** of coastal hazards.



Understanding some key terminology

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

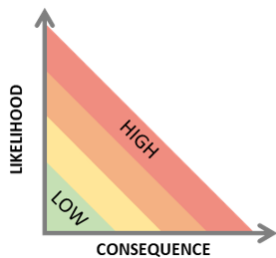
Risk: A risk is the change of something happening that will have a negative effect.

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

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



Determining risk



Likelihood: This considers the probability of the risk eventuating.

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



Managing risk

Our strategy is just the start!

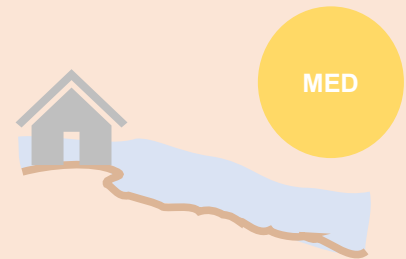
Our Isaac Resilient Coast Strategy sets out a number of adaptation actions that will ensure our coastal communities continue to be a beautiful and safe place to live and play.

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

LEVELS OF RISK



An example of a **LOW** risk hazard event is one that is unlikely to occur and/or has an insignificant impact to human life and property - e.g. some storm tide inundation that causes nuisance to affected properties



An example of a **MEDIUM** risk hazard event is one that is likely to occur and/or has a moderate impact to human life and property.



An example of a **HIGH** risk hazard event is one that is very likely to occur and/or has a catastrophic impact to human life and property



VISION

“The communities of the Isaac Coast deeply value their connections to the Great Barrier Reef, the Coral Sea, Broad Sound, offshore islands, coastal estuaries and foreshores.

The process of building resilience to coastal hazards balances people’s connections to the natural environments of the Isaac Coast with proactive measures that drive socially sustainable outcomes for communities.”





4.0 OUR STRATEGY FOR ACHIEVING A RESILIENT COAST

The vision for the Our Resilient Coast Strategy will be achieved by aligning our adaptation actions with a number of Council endorsed adaptation principles developed for the Isaac region.

Three broad adaptation themes are identified under which strategic 'whole of coast' adaptation actions and local adaptation option pathways are identified. The principles, whole of coast actions and local adaptation option pathways provide the basis for how we plan to respond to and manage the risks from coastal hazards and to enhance the resilience of our coast and communities. This is essential to ensure our communities today, as well as future generations, can continue to enjoy our coast and valued lifestyle.

OUR STRATEGY IS MADE UP OF THE FOLLOWING:



OUR ADAPTATION PRINCIPLES: A FOUNDATION FOR A RESILIENT COAST

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

The principles and adaptation options have been developed with input from key stakeholders and to reflect broader community engagement findings on key coastal values and best practice coastal hazard risk management approaches.

The principles provide a foundation for considering the suitability of different adaptation approaches, supporting consistent decision making for the implementation of region-wide and tailored strategic adaptation actions for each community.

THE PRINCIPLES UNDERPINNING ADAPTATION IN THE ISAAC REGION ARE TO:

- | | |
|---|--|
| <p>1 Adaptation pathways retain and enhance the unique and iconic coastal identity, qualities and character of the Isaac coastal region.</p> | <p>2 Plan for life of project stakeholder communication and engagement.</p> |
| <p>3 We prioritise adaptation responses in higher risk areas to keep people safe and limit future land use exposure in areas of unacceptable or intolerable risk.</p> | <p>4 Physical adaptation responses complement the aesthetics of their surrounds and achieve multiple public benefits. Fitting in with 'place' is important.</p> |
| <p>5 Adaptation options comply with environmental regulations to ensure protection of natural coastal processes, ecological processes and wildlife habitats.</p> | <p>6 We prioritise natural and soft solutions over hard engineering solutions where satisfying cost-benefit requirements and achieving holistic social sustainability outcomes.</p> |
| <p>7 We prioritise public funding of solutions to protect 'public good' assets over private benefit. Investment in private benefit solutions is subject to identification of appropriate external funding channels and achievement of holistic social sustainability outcomes.</p> | <p>8 Future investment in community assets and infrastructure is 'risk informed' – we avoid investing in long design life or costly community assets and infrastructure in higher risk areas and transition our priority assets out of higher risk areas.</p> |

THE HIERARCHY OF PREFERRED ADAPTATION APPROACHES, IN ORDER OF HIGHEST TO LOWEST PREFERENCE IS:

- Avoid** building new 'high value' or 'long life' assets in coastal hazard areas of unacceptable risk.
- Build** community resilience through education and community awareness measures.
- Enhance** coastline resilience by protecting or reinstating natural coastal ecosystems.
- Modify** existing and future buildings and infrastructure to accommodate coastal changes – build things 'higher and stronger', flood resilient building design, evacuation planning in areas of tolerable risk etc.
- Protect/defend** priority shorelines, localities and infrastructure through the use of beach nourishment, seawalls, levees, groynes or other structures.
- Transition** over time existing assets and buildings out of higher-risk areas – last resort option.

FLEXIBLE PATHWAYS AND TRIGGER POINTS FOR ADAPTATION PATHWAYS

Best practice adaptation planning calls for a flexible ‘pathways’ approach to respond to the challenge of not knowing the precise timing of when coastal hazards may occur or the rate of coastal change.

Flexible pathway approaches are a sequence of adaptation actions (or combination of actions) to be implemented over time.

The implementation of actions relies on ‘trigger points’ linked to changing coastal hazard conditions over time. Decisions are then informed by regular monitoring of changes and unacceptable impacts in each locality

Once an adaptation action is implemented, it is used until it is no longer effective or viable to manage the risk or extent of change. In this instance, another action may be required, and the next step/action is then implemented. This is called a trigger point. Trigger points can also be used in locations where hazards are not yet occurring but are projected to occur in the future.

An adaptation pathway is a decision-making strategy that is made up of a sequence of steps or decision points over time.

The Our Resilient Coast Strategy sets out a series of strategic adaptation actions and local adaptation option pathways linked to current and projected sea level rise and erosion triggers.

Strategic adaptation actions form the basis for adaptation pathways to be applied to different parts of the Isaac coast. The implementation of local adaptation option pathways will need to be further investigated and selected based on community attitudes at that time.

The pathways approach supports flexible and informed decision making that responds to change as it is needed. It helps Council take a coordinated and strategic approach to the sequencing, prioritisation and tailoring of adaptation actions.

It is important to understand there is no ‘one size fits all’ approach to adaptation. Every community and locality will have its own locally responsive adaptation pathway and sequenced actions over the short, medium, and longer term to respond to current and future coastal hazard risks.

Everyone has a responsibility to care for the coast and has a role in coastal hazard adaptation action.

Council will be seeking opportunities for partnerships and collaboration with First Nations Peoples, the Queensland Government, business, industry, other external asset providers, and the broader community to deliver adaptation actions in this strategy.

Council will be responsible for implementing actions for the protection and management of Council-owned infrastructure, assets and land.

WE HAVE IDENTIFIED ACTIONS TO BE IMPLEMENTED ACROSS THE ENTIRE ISAAC COASTAL REGION AND SEVERAL WHICH ARE SPECIFIC TO EACH COASTAL COMMUNITY.

Our adaptation actions have been prepared based on short, medium and long-term preliminary priorities which are linked to projected sea level rise and indicative coastal hazard extent mapping prepared for three timeframes – present day, 2050 (0.3m sea level rise) and 2100 (0.8m sea level rise).



SHORT-TERM

Current coastal hazard risks



MEDIUM-TERM

Coastal hazard risks around 2050 (0.3m sea level rise)



LONG-TERM

Coastal hazard risks around 2100 (0.8m sea level rise)

STRATEGIC ADAPTATION THEMES

Three themes of adaptation have been defined for the Isaac Our Resilient Coast Strategy. For each adaptation theme, strategic adaptation actions are defined and described and form the basis for strategic local adaptation option pathways to be applied to different coastal locations.

1 Build Partnerships and Community Resilience

Building community resilience relies on building strong relationships between Council, the community, and community organisations. Regular monitoring to understand the extent of actual coastal change at the local level and to identify when a trigger point is reached is a collective action that everyone can be involved in. Actions under this approach also include activities and programs often already being undertaken such as community awareness raising, active management of natural areas and ecosystems, emergency response, land use planning and asset management.

While these actions do not always directly reduce the risk of coastal hazards, they can accommodate some risks and are important to improve and strengthen the resilience of our coast over time.

2 Modify

The modify approach uses physical measures to accommodate and mitigate against coastal hazard risks to an acceptable or tolerable level. These actions include various engineering (soft and hard) options and hazard resilient design measures to protect/upgrade assets and reduce the impacts of coastal hazards. Over time, monitoring may indicate the risk profile is increasing and the modify option is no longer effective or efficient to accommodate or mitigate coastal hazards.

3 Planned Transition

The planned transition approach applies to the staged relocation or repositioning of assets in specific areas that have an intolerable exposure to coastal hazards. This approach is intended to facilitate change in how we use and manage land in high or extreme risk areas and includes actions such as the managed relocation of assets and infrastructure, as well as a range of policy responses to reflect a more risk appropriate land use.

STRATEGIC ADAPTATION ACTIONS

1 Build Partnerships and Community Resilience

These strategic adaptation actions are applicable to all coastal communities. Building community resilience relies strongly on regular monitoring to understand the extent of actual coastal change at the local level and to identify when a trigger point is reached. Depending on the selected indicators, monitoring can be undertaken by Council, peak bodies, individuals and community groups.

Actions under this approach also include activities and programs often already being undertaken by Council, the community and other organisations, such as community awareness raising, active management of natural areas and ecosystems, emergency response, land use planning and asset management. Building partnerships is essential for the two-way flow of information, knowledge sharing and collaboration on actions.

While these actions do not always directly reduce the risk of coastal hazards, they can accommodate some risks and are important to improve and strengthen the resilience of our coast over time.

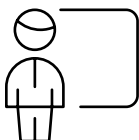
Monitor



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

Monitoring will inform how risk profiles are changing over time and if adaptation pathway actions are appropriate and effective or need adjusting. Monitoring also improves our understanding of coastal processes and coastal hazards over time and can be used to support hazard and risk refinement. Monitoring covers a wide variety of activities and may involve examining beach condition, profile and recession rates, mangrove / vegetation extents and recession rates, dune vegetation extents and dune stability, habitat health, connectivity and availability, distance between built assets and an erosion escarpment, frequency of damage to beach access and other infrastructure, asset condition, performance and maintenance regimes, frequency of tidal inundation, number of properties impacted by hazard events etc.

Community awareness, education and partnerships



Build community understanding, awareness and resilience for coastal hazard risk adaptation by providing ongoing information and messaging about coastal hazards, risks, monitoring and adaptation actions. This will require partnership between all levels of government, Traditional Owners, business, industry and the community.

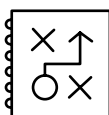
Opportunities for community awareness and education can be enhanced by inviting people to be involved in climate change adaptation activities, such as dune and wetland restoration and monitoring activities. This also includes building on existing Council programs and resources, for example in disaster preparedness, response and recovery, as well as targeted coastal hazard campaigns and communications materials including signage, events, newsletters and social media.

Emergency response



Monitoring and early warning systems, including evacuation strategies. 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.

Hazard avoidance for new or upgraded community infrastructure in coastal hazard areas



There may come a point where Council or other public asset owners need to replace or upgrade community infrastructure regardless of coastal hazards. Where this happens, care should be taken to avoid locating new important community infrastructure with a long design life in hazard areas. This adaptation option may involve progressively locating the footprint of replacement infrastructure further landward over time if technically possible. The asset owner will need to consider opportunities associated with the design life of assets to support relocation of assets once they are due for replacement. Monitoring will be important to determine when relocation may be socially and economically acceptable.

Ecosystem management



Support and strengthen natural coastal habitats, dune processes and protect and restore degraded wetland habitat through habitat management programs such as planting of vegetation on dunes and within and around wetlands and waterways. This provides both ecological and amenity benefits and provides an opportunity to involve and educate the community to naturally manage coastal hazard risks and support monitoring activities.

Planning responses



Implementing land use planning responses that are risk-appropriate for the location in the coastal hazard area. Getting our strategy right and making informed risk-based decisions for future land use, development and infrastructure is based on a complete understanding of risk. Land use and development policy, zoning and development controls will be used to maintain the current risk profile in areas of acceptable and tolerable risk. In coastal hazard areas where the risk is high or intolerable, land use planning will be used to reduce or avoid increasing the future risk exposure of people, buildings, community facilities and infrastructure.

These actions build on current planning scheme requirements and may also involve development controls such as setbacks and planning processes such as master planning or trigger-based development approvals. Particular attention will be given to avoiding placing future vulnerable uses and people (e.g. new homes and accommodation facilities) and reducing the future intensity of uses within coastal hazard risk areas.

2 Modify

Strategic adaptation actions which seek to 'modify' our coastal environment include various engineering (soft and hard) options as well as hazard resilient design measures to protect assets and reduce the impacts of coastal hazards. These actions could be delivered by a range of different stakeholders including private landowners. Whilst these actions have the ability to reduce risk, it is important that we consider the implications of these options in terms of impact on amenity, access to the beach and ecological processes. For the purposes of this strategy there are three strategic adaptation actions that seek to respond to coastal hazard risks.

Coastal engineering (soft)

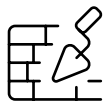


Protect beaches and foreshore areas from coastal hazards using soft engineering solutions such as:

- Dune construction and restoration – artificial construction of new dunes or improving the protective function of existing dunes using imported sand from inactive sand sources
 - Beach nourishment – manual placement of sand on the beach using inactive sand sources to maintain existing beaches and dunes
 - Beach scraping – manual pushing of a thin layer of sand from the beach face (above high tide) towards the dune face to prevent further dune collapse following erosion
-

Coastal engineering (hard)

Using hard engineering solutions to protect beaches, foreshore and creek front areas from coastal hazards including:



- Levees / dykes – an artificial barrier often constructed of earth covered in vegetation to prevent inundation of landward areas.
 - Seawalls / scour protection – a wall or embankment constructed of rock or other materials parallel to the beach or along the banks of a waterway to stop coastal erosion. May also be able to be designed to also limit inundation.
 - Groynes and artificial headlands – an artificial barrier constructed perpendicular to the beach to trap and hold beach sediments and build beach width.
 - Tide gates – permanent artificial barriers across narrow waterways to stop elevated water levels from moving to upstream areas.
-

Modify infrastructure and hazard resilient design



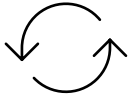
Allow for continued use of infrastructure, buildings and assets where the coastal hazard risk is tolerable, but when upgrading or building new assets, the design is to be resilient to or accommodate coastal hazard impacts.

Appropriately designing roads, utilities, electricity and telecommunications can help services to remain operational during and after a coastal hazard event. This can be achieved through taking hazards into consideration during the infrastructure design process, such as raising land levels and building on piles to increase the height of building floor levels to reduce the level of exposure to temporary inundation. Asset management and maintenance decisions are informed by a complete understanding of coastal hazard risks. Asset owners must consider implications for the design life and resilience of assets to coastal hazards.

3

Planned Transition

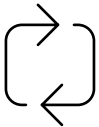
Planned or managed interventions to transition an area to an alternative land use; may involve relocation of assets that are exposed to unacceptable risks.



Accept the risk and embrace coastal processes

Embrace natural coastal processes without further intervention including:

- Accept loss of land or assets affected by coastal hazards on unprotected shorelines.
- Allow coastal dunes and habitats to migrate landward without intervention, potentially leading to damage or loss of public or private infrastructure.



























Land swap or buy back

Land swap or buy back can be applied to areas where the risk exposure to buildings, assets and people is unacceptable or intolerable. Land swap involves exchanging privately owned land for an alternative property located out of the hazard area. Land buy back involves buying private land in a higher risk area instead of exchanging it for an alternative site. Any privately built infrastructure may then be relocated or removed and the land used for a risk appropriate, coastal management purpose (e.g. open space (or similar)). These options directly reduce the risk to life and property.

WHOLE OF REGION STRATEGIC ADAPTATION ACTIONS

The strategic adaptation actions relevant to the whole Isaac Region are **build partnerships and community resilience**

- Monitoring
- Community awareness, education and partnerships
- Emergency response (e.g. evacuation)
- Hazard avoidance for new and replacement community infrastructure (high-value, long life community infrastructure planning and management)
- Ecosystem management
- Land use planning responses

WHOLE OF REGION STRATEGIC ADAPTATION ACTIONS		Short term	Medium term	Long term
	Monitor			
	Community awareness, education and partnerships			
	Emergency response			
	Hazard avoidance for new or upgraded community infrastructure in coastal hazard areas			
	Ecosystem management			
	Planning response			

The following considerations have informed the strategic adaptation actions for each locality:

FINANCIAL SUSTAINABILITY

Adaptation can be expensive, and we cannot treat the whole coastline. Council is currently managing the coast with very limited resources and therefore 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 SPECIAL PLACES AND INFRASTRUCTURE

Protecting important assets should not be at the expense of what we value and love.

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.

Responding to coastal hazards and climate change is a shared responsibility among everyone in the Isaac community. Council will share information and provide guidance to support business and homeowners to understand their coastal hazard risks and build their resilience to climate change.

The Queensland Government has developed tools to help households start taking the first steps to identify and respond to climate related risks. The tools include information on climate change, checklists to assess risks and links to other resources.

You can access these resources on the Queensland Government website [here](#) and [here](#).

5.0 OUR LOCAL ADAPTATION OPTION PATHWAYS

Each coastal community in the Isaac Region is different and requires unique adaptation actions to support key community values, respond to the local risk profile and reflect best practice principles for coastal hazard risk management. In addition to the whole of region adaptation actions, this chapter provides an overview of strategic adaptation actions developed specifically for each coastal community.







ILBILBIE AND GREENHILL

Greenhill is the northernmost coastal community in the Isaac region, perched on elevated land surrounded by the Coral Sea and estuarine waterways.

Consisting of a residential community adjoined by rural residential land, an aquaculture facility and a caravan park, it is the last population centre before Cape Palmerston and is approximately 10km east of the Bruce Highway. The settlement is unsewered and has no reticulated water.

The broader area known as Ilbilbie is dominated by rural land uses. Most of the land close to the open coast is privately owned and/or low-lying, making this area difficult to access by vehicle and limiting development close to the coast.

Notch Point Camping Reserve is one of the few locations providing access to the coast; this is a popular site even though no facilities are provided.

The coastline in this area consists of sand beaches separated by numerous rocky outcrops and creek outlets. Fronted by intertidal sand flats and tidal deltas hundreds of metres wide, the beaches are backed by well vegetated dune systems of variable height and condition.

WHAT'S IMPORTANT TO OUR COMMUNITY

There are many places in Ilbilbie and Greenhill which support our liveability, way of life and environment, including:

- Coastal amenities and places, including campgrounds and facilities/areas that attract tourists
- The natural areas, including the beaches and waters and unobstructed natural views
- Agricultural resources and infrastructure, including productive cane lands and road/rail infrastructure
- Community facilities and services, like the SES shed
- Cultural attractions, including historical sites and places of interest

OUR FINDINGS

Sea level rise and coastal erosion presents the highest level of risk to the special places in Ilbilbie and Greenhill. The places and infrastructure at risk from coastal hazards include:

BEACHES AND DUNE AREAS

The beaches and dune areas around Greenhill have been assessed as being at extreme risk from sea level rise, medium risk from erosion and low risk from storm-tide inundation under all climates.

TOURIST ACCOMMODATION

The Notch Point Camping Reserve is at high risk from erosion under all climates.

Parts of the Cape Palmerston Holiday Park site are at risk under the 2100 future climate, with low-lying areas close to estuarine waterways at medium risk from storm-tide and high risk from sea level rise and erosion.

RESIDENTIAL PROPERTIES

Seven rural residential land parcels are at high risk from erosion under the present climate, increasing to 12 by the 2100 climate, while high risks from sea level rise affect eight land parcels by the 2100 climate. Risks are largely confined to the low-lying estuarine frontages of these parcels.

AGRICULTURAL AREAS AND INFRASTRUCTURE

The Notch Point Prawn Farm and Northern Prawn Farm sites are both at high risk from sea level rise and erosion, and medium risk from storm-tide inundation under all climates. Inundation extents mainly affect lagoon areas. Sections of privately-owned, narrow gauge railway line used for cane haulage are at high to extreme risk from erosion hazards at waterway crossings.

NATURAL AREAS

The reserve (open space zone) abutting the main beach area at Greenhill is at high risk from erosion and medium risk from sea level rise and storm-tide under all climates.

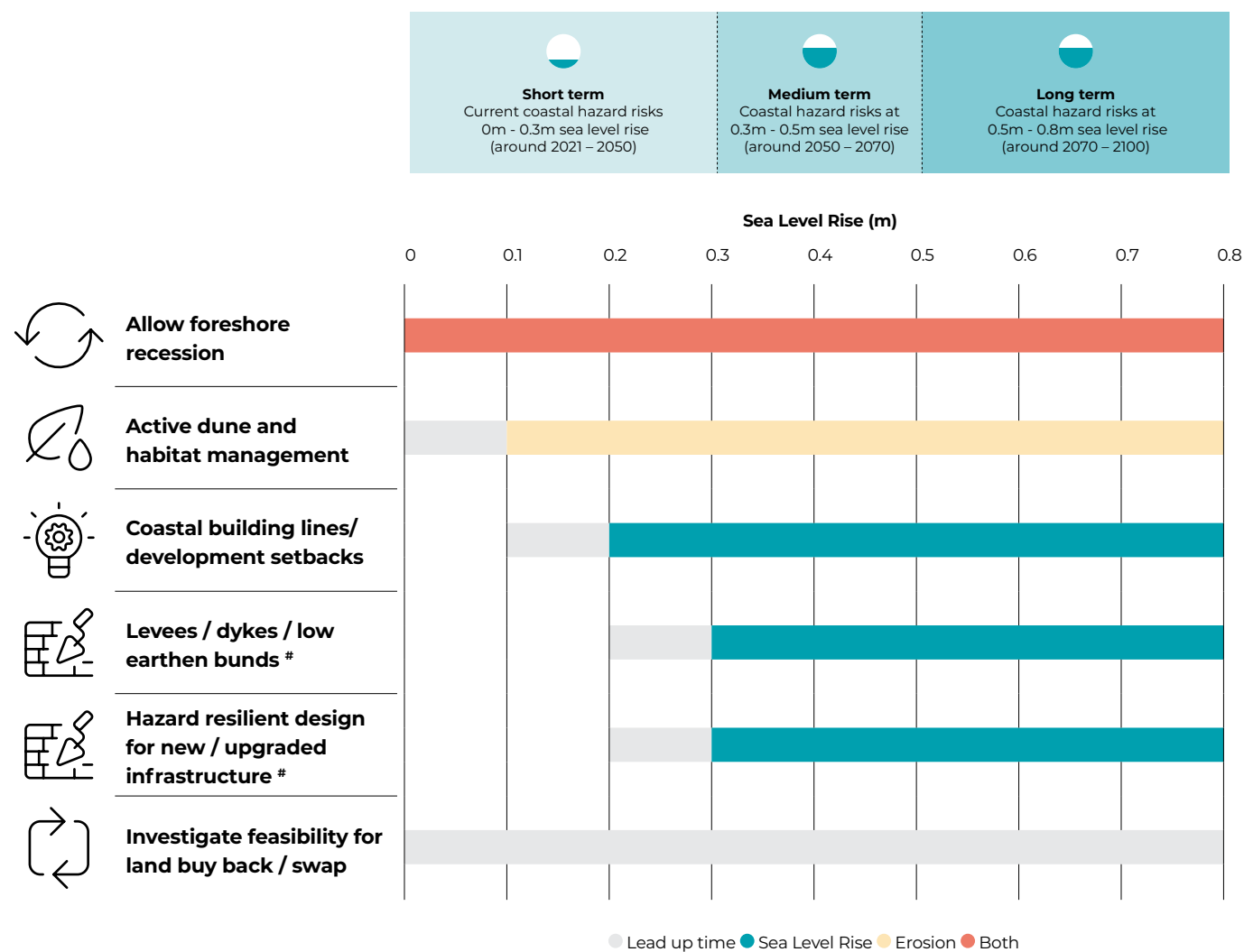
IMPORTANT INFRASTRUCTURE

The high voltage power line network is at extreme risk from erosion under all climates where it crosses waterway areas, mainly due to the risk of towers being undermined.

Sections of Notch Point Road between the Prawn Farm and Notch Point Camping Reserve are at medium risk from storm-tide inundation and erosion under all climates. Access along this road is already dependent on tides, and it is anticipated that access to and from the Camping Reserve will be further constrained as sea levels rise.

LOCAL ADAPTATION OPTION PATHWAYS AND TRIGGER POINTS FOR GREENHILL

The strategic adaptation option pathways and triggers in response to coastal hazards (sea level rise and erosion hazard) are illustrated in the graph below for Greenhill.

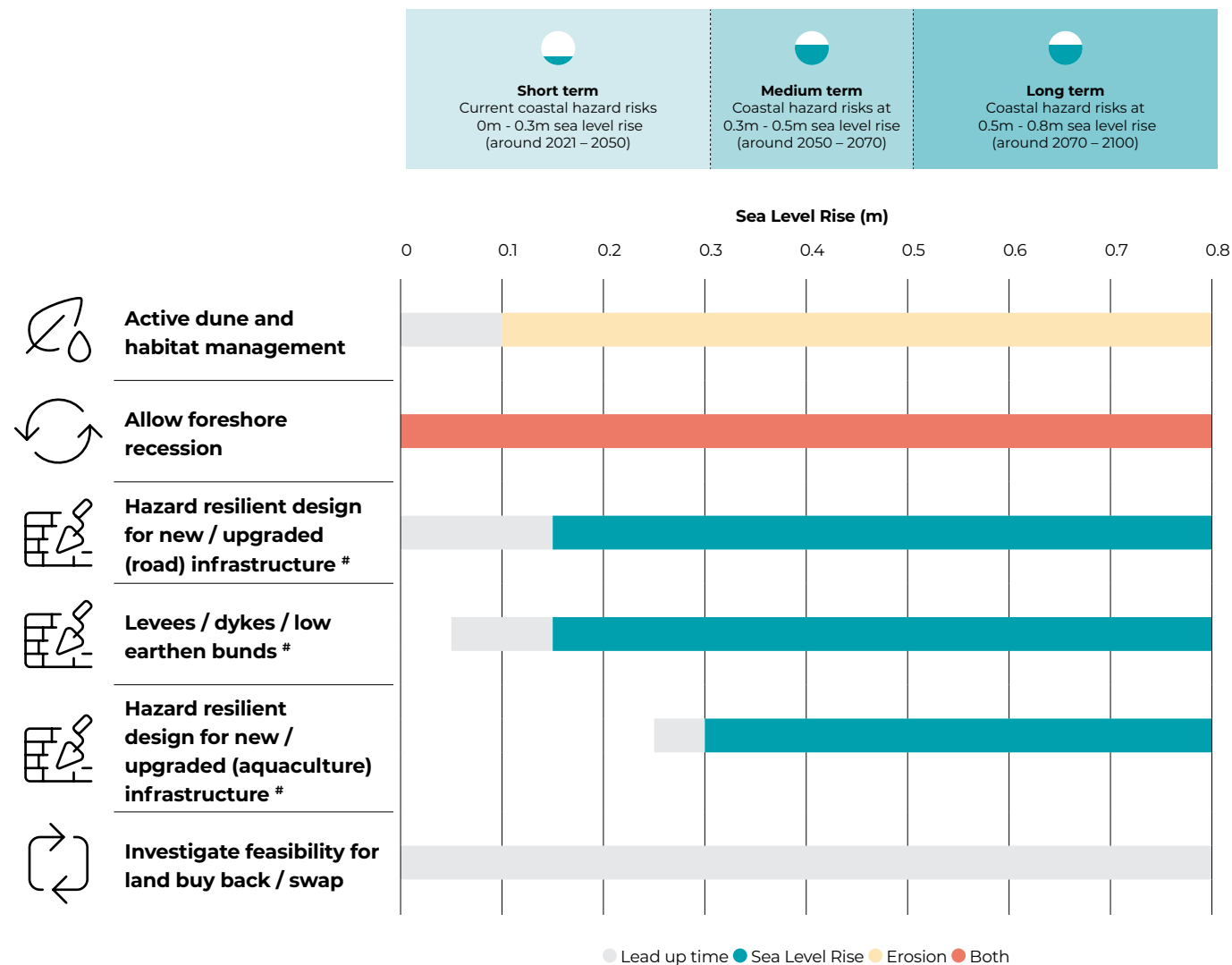


Editor's notes

These options require further consideration and are subject to further detailed site investigations, business case, funding commitments, detailed design and statutory approvals. The Lead up time is intended to be a trigger to provide sufficient time for further consideration and detailed investigations / funding commitments and approvals to be obtained.

LOCAL ADAPTATION OPTION PATHWAYS AND TRIGGERS FOR NOTCH POINT

The strategic adaptation option pathways and triggers in response to coastal hazards (sea level rise and erosion hazard) are illustrated in the graph below for Notch Point.



Editor's notes

These options require further consideration and are subject to further detailed site investigations, business case, funding commitments, detailed design and statutory approvals. The Lead up time is intended to be a trigger to provide sufficient time for further consideration and detailed investigations / funding commitments and approvals to be obtained.

 Carmila Sportsground



CARMILA BEACH

Carmila Beach is a small coastal settlement approximately 6km east of Carmila.

The settlement is serviced by one road providing access to services in Carmila such as emergency services, a school, mechanical repair, fuel and grocery supplies, community facilities, sporting grounds and the Bruce Highway.

The resident population of Carmila Beach is very small, with most houses set approximately 40m landward of the beach behind well vegetated dunes. Some of these properties are used as holiday homes.

Park facilities are adjacent to a boat ramp that provides access to Carmila Creek and on higher tides the Coral Sea. The settlement is unsewered and has no reticulated water.

At the southern end of the beach there is a popular beachfront campground with limited amenities. The beach is fronted by a 500m wide intertidal sand flat. The dunes in the campground are less well vegetated than those to the north due to camping activities and traffic.

WHAT'S IMPORTANT TO OUR COMMUNITY

There are many places in Carmila Beach which support our liveability, way of life and environment, including:

- Coastal amenities and places, including campgrounds and access to the foreshore.
- The natural areas, including the beaches and waters, creek system and fishing areas.
- Agricultural resources and infrastructure, including productive cane lands.
- Access to community facilities at Carmila.
- Access to essential community services – electricity infrastructure; access to emergency services and the service station.

OUR FINDINGS

Storm-tide inundation and sea level rise present the highest level of risk to the special places in Carmila Beach as a result of Carmila Creek (north) and Feather Creek (south). These coastal hazards also have the potential to isolate the community, particularly from storm-tide inundation by 2050 and sea level rise by 2100. Carmila Beach is also exposed to open coast erosion impacts.

The places and infrastructure at risk from coastal hazards include:

BEACHES AND DUNE AREAS

The beaches and dune areas along the Carmila Beach open coast frontage have been assessed as being at extreme risk from sea level rise, medium risk from erosion and low risk from storm-tide inundation under all climates.

TOURIST ACCOMMODATION

All 12 properties in the Village (Holiday and Residence) zone are at extreme risk from open coast erosion by the 2050 climate. Prior to this time the undeveloped esplanade buffers these properties from direct impacts. There are 3 properties at medium risk from storm-tide impacts by the 2100 future climate.

Carmila Beach campground (including the amenities building close to Feather Creek) is at medium risk from storm-tide and high risk from erosion and sea level rise under all climates.

ROAD INFRASTRUCTURE

A 6m section of Carmila Beach Road is expected to be at high risk from sea level rise by 2050. This increases to a 600m section at extreme risk by 2100. Inundation will result in the township becoming isolated. Isolation will occur under storm-tide scenarios however the overall risk is medium due to the lower likelihood and temporary nature of the inundation.

AGRICULTURAL INFRASTRUCTURE

Sections of privately-owned, narrow gauge railway line used for cane haulage are at high to extreme risk from erosion hazards at waterway crossings.

IMPORTANT INFRASTRUCTURE

The high voltage power line network is at extreme risk from erosion under all climates where it crosses waterway areas, mainly due to the risk of towers being undermined. The pole and wire electricity supply to Carmila Beach (from Carmila) is the sole source of power to the community. Approximately 900m of line is at extreme risk under the present climate and by 2100 this is expected to increase to more than 1700m at extreme risk.

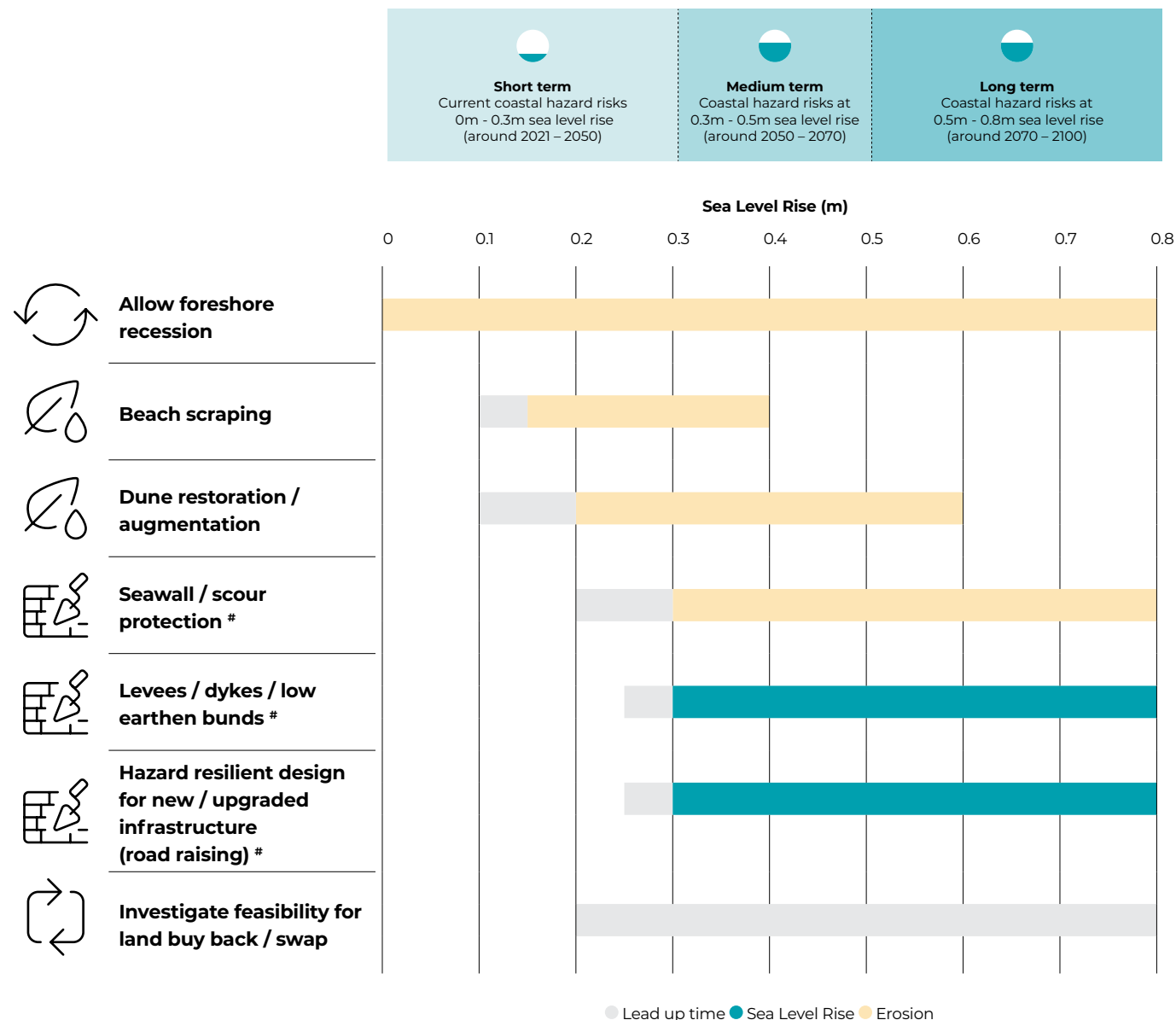
BEACH ACCESS AND BOAT RAMPS

The boat ramp is at high risk from erosion under all climates. The boat ramp is designed to be inundated, so it is at low risk from sea level rise and storm-tide inundation.



LOCAL ADAPTATION OPTION PATHWAYS AND TRIGGER POINTS FOR CARMILA BEACH

The strategic adaptation option pathways and triggers in response to coastal hazards (sea level rise and erosion hazard) are illustrated in the graph below for Carmila Beach.



Editor's notes

These options require further consideration and are subject to further detailed site investigations, business case, funding commitments, detailed design and statutory approvals. The Lead up time is intended to be a trigger to provide sufficient time for further consideration and detailed investigations / funding commitments and approvals to be obtained.

CLAIRVIEW

MEN



CLAIRVIEW

Clairview is a beachfront settlement at the northern end of Broad Sound, situated on a narrow coastal strip between the Coral Sea and a low mountain range.

The community is split into two main sections with an undeveloped gap between them. Over a distance of 4km, a single row of housing adjoins most of the reserve containing the beach and dune and is backed by an access road (Colonial Drive), the main north coast rail line and the Bruce Highway. The township is surrounded by rural land uses.

Most dwellings in the southern section of the beach are located on or close to the secondary dune, which in places has been denuded of trees and shrubs. At the northern end of the beach the houses are set back from the beach by up to 100m and the dune is notably well vegetated, although the land is low-lying.

Popular for fishing and crabbing, many dwellings are holiday homes so are not permanently occupied all year round. A formal boat ramp is located near the BarraCrab caravan park at the southern end of the settlement, with informal boat launching into a small creek at the northern end of the settlement. The caravan park kiosk also serves as the general store and post office for the community.

Key community assets include the Clairview community centre, helipad and rural fire service facility. Due to the narrowness of the coastal strip, access to the Bruce Highway for evacuation purposes is essential for community safety, as there is no evacuation centre or medical facility within the community. The settlement is unsewered and has no reticulated water

WHAT'S IMPORTANT TO OUR COMMUNITY

There are many places in Clairview which support our liveability, way of life and environment, including:

- Coastal amenities and places, including Clairview Beach, informal boat launch points, foreshore areas and off-shore areas (Avoid Island, Percy Island).

- The natural areas, including the beaches and waters, fishing areas and habitat breeding areas (fish, dugongs).
- Tourism and recreation assets, including BarraCrab caravan park, events (markets and fishing competitions), and views / vantage points of the Pacific Ocean.
- Community facilities and services, including the community centre, caravan park memorial.
- Essential community services – rural fire service, access to Bruce Highway for emergencies.

OUR FINDINGS

Erosion hazards and sea level rise present the highest level of risk to the many special places in Clairview. The places and infrastructure at risk from coastal hazards include:

BEACHES AND DUNE AREAS

All of the beach and dune areas along the Clairview open coast frontage have been assessed as being at extreme risk from sea level rise, medium risk from erosion and low risk from storm-tide inundation under all climates.

COMMUNITY FACILITIES AND OPEN SPACE AREAS

The coastal Reserve that runs parallel to the beach is at extreme risk from sea level rise and erosion hazards, and medium risk from storm-tide under all climates. This reserve contains important community infrastructure including a boat ramp, a community hall, playgrounds and rural fire brigade facilities. The community centre and rural fire brigade buildings are at extreme risk from 2050 onwards.

RESIDENTIAL PROPERTIES

There are 43 properties in the Village (Holiday and Residence) zone that are at extreme risk from erosion under the present climate. By the 2100 climate, the number of properties at extreme risk increases to 110.

There are two properties already at intolerable risk from sea level rise as

they are within the present climate sea level rise extents. By 2050, nine properties will be at intolerable risk and a further 10 properties will be at an intolerable risk by 2100.

TOURIST ACCOMMODATION

The BarraCrab Caravan Park at the southern end of the beach is at high risk from erosion by the 2050 future climate onwards.

ROAD INFRASTRUCTURE

Various sections of Colonial Drive are at medium risk from erosion hazards under all climates, but approximately 280m is at high to extreme risk from sea level rise by 2100. Impacts to Colonial Drive will disconnect the community and increase the time taken for residents to access the helipad at the northern end of the beach. By 2100, access to the helipad for all residents may be restricted and access to the Bruce Highway for northern residents may be impeded.

Waterway crossings of the Bruce Highway have been assessed as being at extreme risk from erosion where there is no scour protection under existing bridge crossings.

RAIL INFRASTRUCTURE

Sections of the North Coast railway line are at extreme risk from erosion hazards at waterway crossings. A substantial section of the North Coast railway line is at medium risk from the 2100 climate storm-tide on the southern approach to the crossing of Turners Hut Creek.

IMPORTANT INFRASTRUCTURE

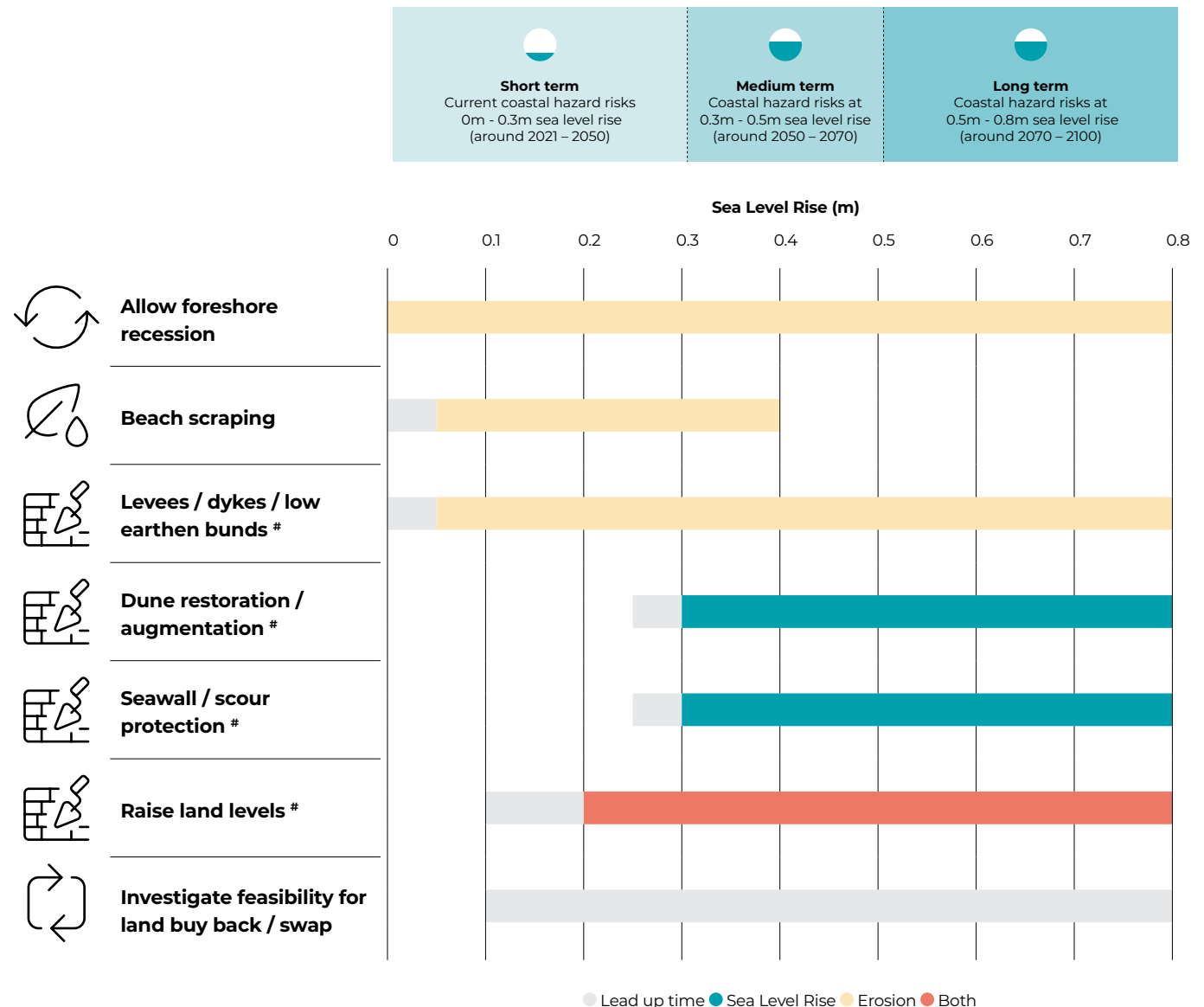
The high voltage power line network is at extreme risk from open coast erosion under all climates where it crosses waterway areas, mainly due to the risk of towers or poles being undermined.

Approximately 400m of line is at extreme risk under the present climate. By 2100 this is expected to increase to more than 1700m at extreme risk and 200m at high risk.



LOCAL ADAPTATION OPTION PATHWAYS AND TRIGGER POINTS FOR CLAIRVIEW

The strategic adaptation option pathways and triggers in response to open coast coastal hazards (sea level rise and erosion hazard) are illustrated in the graph below for Clairview.



Editor's notes

These options require further consideration and are subject to further detailed site investigations, business case, funding commitments, detailed design and statutory approvals. The Lead up time is intended to be a trigger to provide sufficient time for further consideration and detailed investigations / funding commitments and approvals to be obtained.



ST LAWRENCE

Located on St Lawrence Creek approximately 11km upstream of the mouth, the town of St Lawrence is the largest of Isaac's coastal settlements.

The town is approximately 5km east of the Bruce Highway and is serviced by two connection roads that pass through or close to low-lying fresh and saline wetland areas. The main North Coast rail line runs through the town.

The town is situated on a flat plain and bordered by extensive wetlands that are interspersed with rural land largely used for grazing. St Lawrence is one of the oldest colonial settlements on the Queensland coast and contains sites of historical significance. It is also known for the St Lawrence wetlands, which support abundant bird life amongst other important species.

A school, police station, library, public swimming pool, sporting ground, showground, cemetery and other facilities service the needs of a population of over 200 people and visitors. While the community is unsewered, it does have a reticulated water supply. There are no medical facilities in the town, with residents required to travel to Rockhampton or Sarina for medical care.

Due to the very large tidal range in the area, boating access is dependent on tides, and access to navigable water is not always possible. An important boat ramp servicing the community is located on Bund Creek (a tributary of Waverley Creek) to the south of the town.

WHAT'S IMPORTANT TO OUR COMMUNITY?

There are many places in St Lawrence which support our liveability, way of life and environment, including:

- Tourism and recreation assets, including St Lawrence wetlands and the wetlands festival, Margs Park, recreation grounds and caravan park, boat ramp and fishing areas in local waterways.
- Rural areas and productive farmlands.
- Community facilities and services available in the township.
- Cultural attractions, including heritage sites and indigenous rock holes.
- Essential community services – helipad, Flying Doctor box, emergency services, local store.

OUR FINDINGS

As St Lawrence is located within the estuary, erosion processes are associated with rising sea levels and channel migration. Erosion and sea level rise present the highest level of risk to the many special places in St Lawrence. The places and infrastructure at risk from coastal hazards include:

RESIDENTIAL PROPERTIES

Properties in the Village (Rural Centre) zone on the northern fringe of the town are at extreme risk from erosion and sea level rise under all climates, largely due to these properties fringing existing wetland areas. Under the present climate there are 13 parcels at extreme risk from erosion. By 2100 the number of properties impacted by extreme erosion risk increases to 23.

There are 10 parcels which are currently at high to extreme risk from sea level rise and a further two properties will be at an intolerable risk level by 2100.

COMMUNITY FACILITIES AND OPEN SPACE AREAS

Margs Park is at high risk from sea level rise and erosion, and medium risk from storm-tide under all climates.



BOAT RAMPS

The boat ramp is at high risk from erosion under all climates. The boat ramp is designed to be inundated, so it is at low risk from sea level rise and storm-tide inundation, although access to the ramp may become increasingly difficult.

NATURAL AREAS

The reserve containing the St Lawrence wetlands is at high risk from sea level rise and extreme risk from erosion under all climates. The public amenities building on the site is at low risk from storm-tide by 2100.

WATER SUPPLY INFRASTRUCTURE

The St Lawrence Weir is exposed to coastal hazards under all climates. The weir is critical to the water supply network for the town. While the structure is designed for tidal exposure on its downstream face, overtopping of the structure is expected to occur from storm-tide hazards by the 2100 future climate, placing the structure and the St Lawrence water supply at medium risk.

Water mains and valves are exposed to all hazards under all climates. There are extensive sections of the supply network already crossing inter-tidal areas in the vicinity of the St Lawrence Wetlands. The water supply network is at low risk from storm-tide due to the temporary nature of impacts. The network is at high risk from sea level rise and erosion under all climates.

ROAD INFRASTRUCTURE

Waterway crossings of the Bruce Highway have been assessed as being at extreme risk from erosion under all climates, where there is no scour protection under the bridge crossing. All bridge crossing of waterways along the Highway appears to be elevated above sea level rise and storm-tide inundation levels.

Macartney St is at high risk from sea level rise induced erosion at low lying waterway crossings. Parts of Bar Plains Road, Settlement Road and St Lawrence North Road are all at extreme risk from sea level rise under all climates. By 2100, a short section of St Lawrence Connection Road is also at extreme risk from sea level rise. This could result in the town becoming isolated.

RAIL INFRASTRUCTURE

Sections of the North Coast railway line are at extreme risk from sea level rise induced erosion at waterway crossings. Large extents of the elevated causeway on the northern side of St Lawrence Creek are at medium risk from storm-tide inundation in the 2050 and 2100 future climates.

IMPORTANT INFRASTRUCTURE

The high voltage power line network is at extreme risk from erosion under all climates where it crosses waterway areas, mainly due to the risk of towers or poles being undermined.

Approximately 500m of line is at extreme risk under the present climate. By 2100 this is expected to increase to more than 3800m at extreme risk.

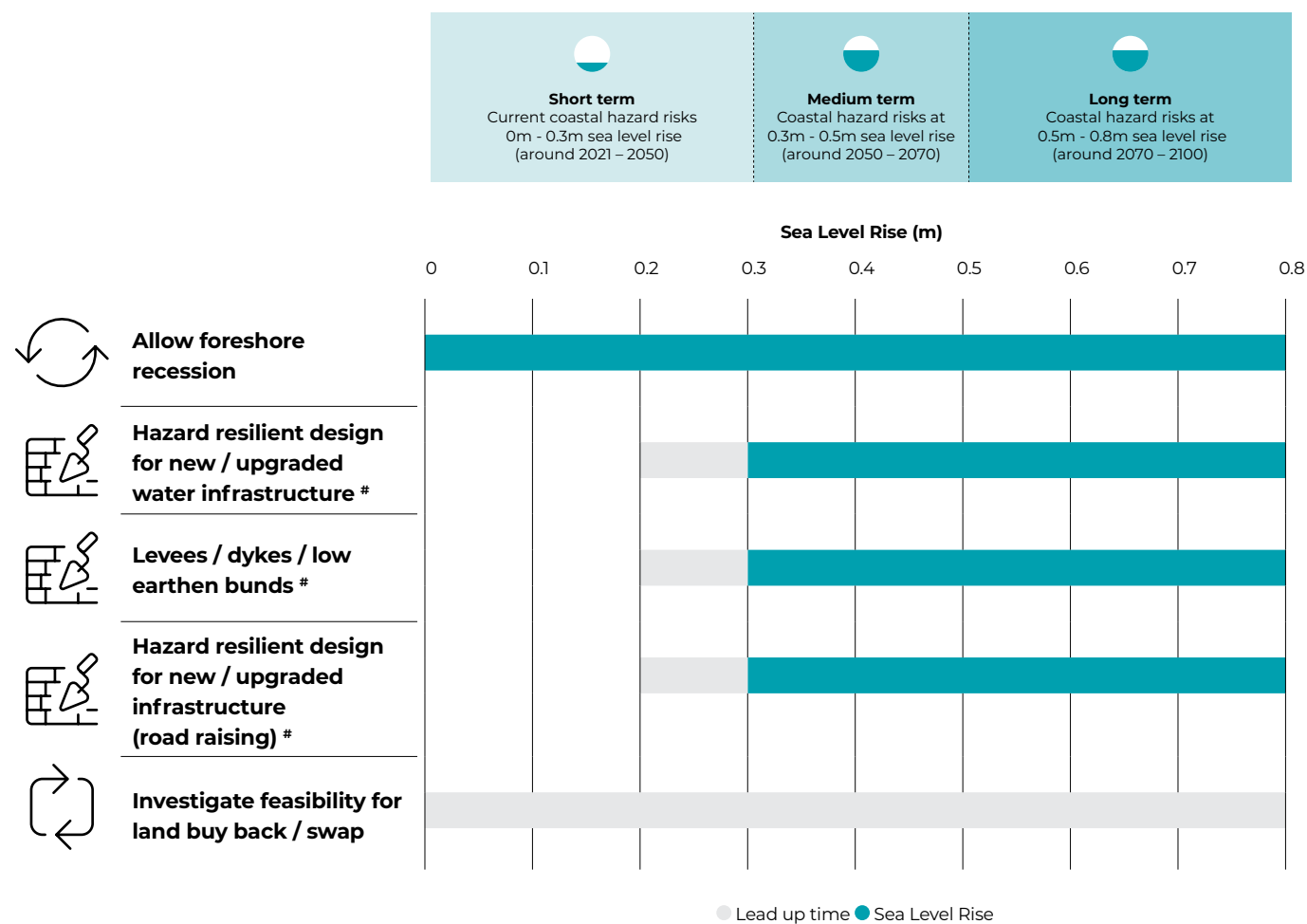
HERITAGE SITES

The Meatworks and Police Station/ Courthouse heritage sites are at medium to high risk under all climates and hazards.



LOCAL ADAPTATION OPTION PATHWAYS AND TRIGGER POINTS FOR ST LAWRENCE

The strategic adaptation option pathways and triggers in response to coastal hazards (sea level rise) are illustrated in the graph below for St Lawrence.



Editor's notes

These options require further consideration and are subject to further detailed site investigations, business case, funding commitments, detailed design and statutory approvals. The Lead up time is intended to be a trigger to provide sufficient time for further consideration and detailed investigations / funding commitments and approvals to be obtained.

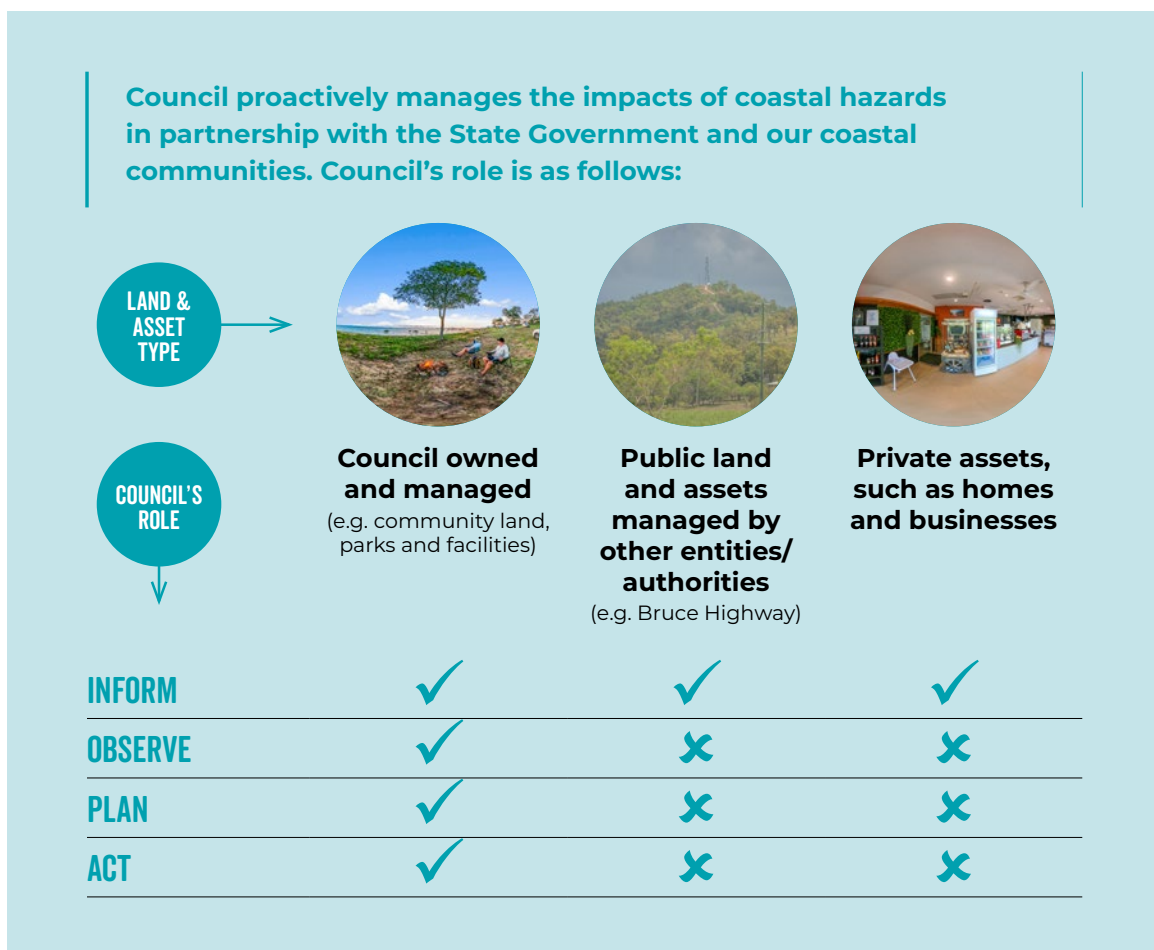
6.0 OUR IMPLEMENTATION ACTION PLAN FOR A RESILIENT COAST

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

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

Council as an asset owner and land manager will ensure assets are appropriately located, designed and maintained to support our communities with ongoing services and infrastructure. Private landowners and other asset owners/entities are responsible for maintaining their own assets in the context of relevant State and Council policy and statutory requirements.

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



THE IMPLEMENTATION PLAN PROVIDES DETAILS ON:

- Indicative timeframes for delivery of actions
- Cost estimates (where available) for short term 5–10-year actions and potential funding sources.
- Council plans, policies, strategies and processes to be updated or created to support action delivery.
- Monitoring and evaluation approaches.
- Potential partnership and collaboration opportunities with the community, other stakeholders and external infrastructure providers.

COUNCIL WILL IMPLEMENT ADAPTATION ACTIONS INTO ITS 'BUSINESS AS USUAL' ACTIVITIES USING THE FOLLOWING EXISTING TOOLS

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

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

- Any changes to the legislative, planning and policy framework e.g.: the State changes the sea level rise projections to be considered in planning (currently 0.8m by 2100) or how coastal hazards are defined etc.
- New development in the city or notable changes to the coastal landscape and landforms.
- Updated technical information including coastal hazard modelling, risk assessment, monitoring data or changes to coastal hazard indicators.

Examples of environmental triggers that might be used could include:

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

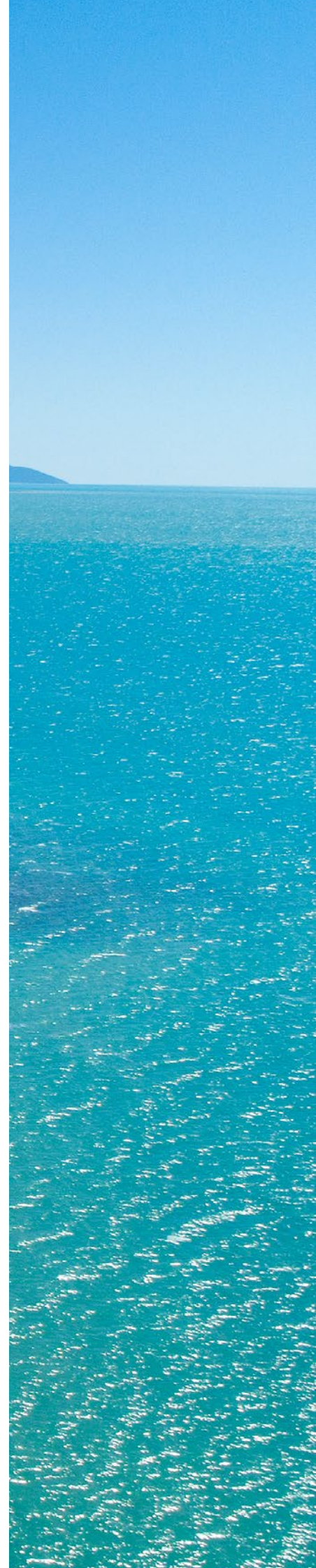




Table 1 provides a summary of implementation actions for the region-wide strategic adaptation responses. The implementation plan focuses on short term actions to be delivered over the next 5 to 10 years.

TABLE 1 Summary of key implementation actions for the whole of region focusing on the short term (5-10 years)

STRATEGIC ADAPTATION ACTIONS	DESCRIPTION	INDICATIVE PRIORITY IMPLEMENTATION ACTIONS (TO BE COMPLETED WITHIN 5–10 YEARS)
<p>MONITOR</p> 	<p>Monitoring will be critical to understanding how coastal hazards and their risks are changing over time. As the coastline changes so should the adaptation actions we take to respond. Each locality with an adaptation pathway will have a monitoring and review program to determine if trigger points for adaptation action remain relevant, effective, timely and cost appropriate.</p>	<p>Seek State and Federal Government funding to:</p> <ul style="list-style-type: none"> • Establish a photo monitoring program (coast snap or similar) across the coast, prioritising key sites and localities. • Establish a beach monitoring program. • Undertake an internal audit and establish a register to monitor the frequency and location of beach scraping works focusing on Clairview and Carmila Beach. • Undertake monitoring for key select areas.
<p>COMMUNITY EDUCATION & CONSULTATION</p> 	<p>Ongoing knowledge sharing, awareness and education is key to enhancing community understanding of coastal processes, changing coastal hazards and risks and adaptation actions. Being 'risk aware' can build resilience in the community through communication and messaging and empowering people to respond.</p> <p>Council will also strongly advocate for collaboration and partnerships with other stakeholders and community to share information and the responsibility in delivering adaptation actions.</p>	<ul style="list-style-type: none"> • Investigate opportunities to secure ongoing funding for a Coastal Resilience Program Officer to support the delivery of adaptation actions and implementation of the Our Resilient Coast Strategy across the organisation. Investigations should look into where this role sits within the Council organisation and how funding could be secured. • Identify existing and new networks to share and promote knowledge sharing and understanding of coastal hazard risks and adaptation. • Establish and strengthen partnerships with Traditional Owners to support and implement adaptation actions. • Facilitate training and education workshops, community awareness raising, community events across the Region and specifically at higher risk localities. • Facilitate resident and community awareness raising on the value of dunes and coastal vegetation and their role in dune management and protection. • Identify stakeholders and residents that are likely to be directly impacted by coastal hazards and undertake targeted engagement and awareness raising of risks at least once per year, particularly for residents in low lying areas adjoining open beaches, waterways and estuaries. • Prepare education material (e.g. fact sheets, information kits) on resilient building design to support residents in improving the resilience of their homes that can be used as constant reference material to explain key concepts such as risk-based planning, coastal hazards, climate change and Council's role in addressing these challenges.

STRATEGIC ADAPTATION ACTIONS

DESCRIPTION

INDICATIVE PRIORITY IMPLEMENTATION ACTIONS (TO BE COMPLETED WITHIN 5–10 YEARS)

EMERGENCY RESPONSE



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

- Review and update the Isaac Region Local Disaster Management Plan with updated coastal hazard mapping and embed risk outcomes in emergency management and response planning.
- Review and update emergency management response for higher risk areas of key localities.
- Monitor frequency and nature of emergency management responses and call outs.

ECOSYSTEM MANAGEMENT



Supporting natural dune processes through dune care and habitat management programs is an action that is currently being done in areas across the coastline and will continue to be undertaken in the future. It provides both ecological and amenity benefits and provides an opportunity to involve and educate the community to manage coastal hazard risks and undertake monitoring.

- Identify priority management areas and develop a plan for active dune and habitat protection, improvement and management. The plan needs to consider the ongoing viability of sand scraping in the area. The plan should focus on Greenhill, Notch Point, Carmila Beach and Clairview.
- Establish an active dune and habitat protection, maintenance and improvement program using Council, Traditional Owners and volunteer resources.
- Expand Council officer resources to implement the active dune and habitat protection, maintenance and improvement program.
- Seek State and Federal Government funding to explore opportunities for establishing a community group to promote and undertake dune care activities.

PLANNING RESPONSE



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

- Review planning scheme to consider implications of the coastal hazard risk assessment outcomes and to reflect the direction and outcomes of the Our Resilient Coast Strategy.
- Council to consider updated coastal hazard mapping and risk assessment outcomes for deciding new land use and development in hazard areas as part of the development assessment process.
- Integrate coastal hazard risk considerations into all strategic planning processes for future communities and master plan and structure plan areas.

MODIFY INFRASTRUCTURE AND HAZARD RESILIENT DESIGN



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

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

GLOSSARY

Hazard

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

Likelihood

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

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).

Coastal hazard risk

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

The extent of coastal land potentially impacted by coastal hazards, as well as the consequences of these coastal hazards, are expected to increase into the future.

Coastal hazard adaptation

Actions undertaken to eliminate or limit the risks posed by a coastal hazard (i.e. sea level rise, storm-tide inundation and coastal erosion). Adaptation can involve many small steps over time or major transformation with rapid change. Climate change is expected to increase the extent, severity and frequency of coastal hazards. For example, tropical cyclones are expected to be more intense and a greater extent of low-lying land will be affected by periodic inundation because of sea level rise.

Resilience to coastal hazards

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

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OUR RESILIENT
COAST
ISAAC COASTAL HAZARD ADAPTATION STRATEGY

ISAAC
REGION 