

PLANNING OUR FUTURE

The Gympie Region Planning Scheme

Gympie Regional Council New Planning Scheme Project

Draft

Coastal Hazards Position Paper

21 June 2023



Introduction

The Cooloolool coastline of the Gympie Local Government Area (LGA) extends over 50 km from Cooloolool Beach, around Double Island Point, along Rainbow beach, around Inskip Point then across Tin Can Bay (Figure 1).

The coastal zone has significant ecological value and includes parts of the UNESCO Great Sandy Biosphere Reserve, the Great Sandy National Park and the RAMSAR listed Great Sandy Strait.

The coastline is characterised by a unique combination of coastal landforms and ecosystems, including some of the highest parabolic dune systems in the world, a dynamic sand barrier spit, and extensive coastal plains and wetlands around the bay, inlets, and estuaries.

The diversity of the landscape features supports a range of land uses with social, cultural, environmental and economic values. The landscape has been shaped by coastal processes over many thousands of years. Erosion and accretion of the shoreline, and inundation of coastal areas are part of these natural processes. However, these processes can become coastal hazards when they have the potential to impact on infrastructure, access, services, our lifestyle and the economy.

Figure 1



Gympie Regional Council (GRC) adopted a Coastal Hazard Management Strategy (CHAS) in February 2022. The purpose of the CHAS is to:

- inform future decisions regarding the protection and management of our coast and foreshore,
- inform future land use planning,
- guide the management of public utilities and facilities,
- guide the management of areas of environmental and cultural significance, and,
- foster collaboration and the shared care of our coastline.

This policy position paper will focus on the elements of the CHAS that are to be implemented via the planning scheme, noting that much of the CHAS program implementation will occur via council's environmental management and capital works/infrastructure activities.

This position paper is one of 13 position papers addressing key aspects of the future land use and development policy for GRC. This paper has been prepared as part of Stage 2 of the Gympie Regional Council Planning Scheme project and is intended to inform the planning scheme drafting process to occur in Stage 3.

Other position papers to be prepared as Stage 2 are as follows:

- Housing
- Retail and Commercial Development
- Rural Land
- Industrial Land
- Heritage
- Bruce Highway Upgrade Response Strategy
- Biodiversity Conservation
- Scenic Amenity
- Flooding
- Bushfire
- Land Stability
- Open Space and Recreation.

Issue 1: Coastal Values

Discussion

The coastal landscape holds significant environmental values:

- Coastal landforms – including extensive dune systems, tidal inlets, coastal plains and sandy beaches.
- Vegetation communities and ecosystems – including the wetlands, mangroves and native dune vegetation.
- Significant and endangered species – including both land and marine environments (e.g turtles, birds and fish).

Well known features of the Cooloola coastline include:

- the RAMSAR listed Great Sandy Strait (including Tin Can Bay and inlet)
- UNESCO Great Sandy Biosphere Reserve
- Great Sandy National Park
- Rainbow Beach and Double Island Point.

From an economic perspective the unique and beautiful coastal landscape of the Cooloola Coast drives a strong tourism sector that is a significant contributor to the Gympie economy. The region attracts over 500,000 tourists that stay a total of over one million guest nights per annum. The region also attracts significant levels of day visitors, particularly out of the Sunshine Coast (both tourists and regional residents).

The beach road along Rainbow Beach and Cooloola Beach is a significant asset, providing recreational values to locals and tourists alike. It is estimated that the annual willingness to pay for access to the beach road at Rainbow Beach is in the order of \$35 million, based on an estimated 300,000 trips per year or around 820 per day with vehicle operating costs of \$14 million and the access permit fees paid.

Community engagement undertaken as part of the preparation of the CHAS identified the values of importance to residents:

- tourism potential,
- the quality of the environment,
- cultural values,
- recreation,
- the character of coastal communities,
- the provision and maintenance of infrastructure, and,
- public safety.

The coastline is a dynamic and picturesque part of the landscape, where the land meets the sea. One of the more challenging aspects of the coastal landscape is that it experiences constant, and often rapid change. Wind and waves continually work to move sediment and shape the shoreline, and extreme weather events can periodically result in substantial erosion and inundation of coastal land.

A resilient coast has social, economic and environmental systems in place to avoid, manage and mitigate the impact of hazardous events or disturbances so that the environmental, economic and community values identified above are not compromised. Resilience means the ability to respond in ways that maintain the essential functions, identity and values of a region, while also being able to proactively adapt to change.

Desired outcome

- The values of the coastal landscape are protected for future generations.

Policy position

- The strategic objective of land use planning for coastal areas is that resilience to coastal hazards is enhanced.

Action

- The new planning scheme is drafted to require that new development in coastal areas results in improved resilience to coastal hazards.

Issue 2: The Nature of Coastal Hazards

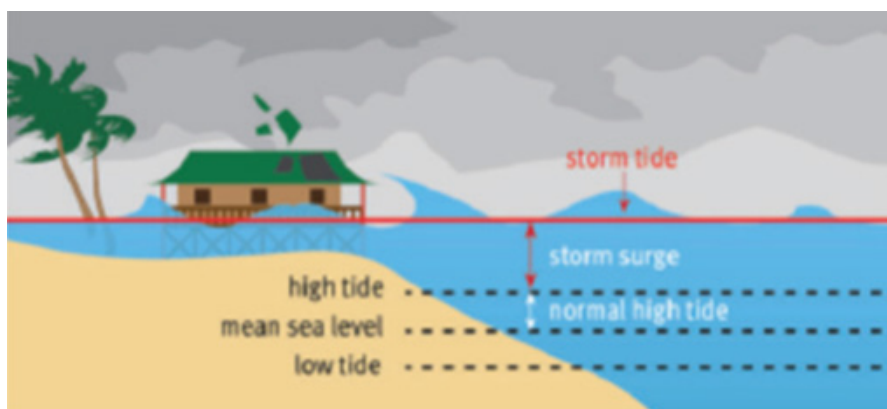
Discussion

Coastal hazards include inundation of low-lying coastal land, the erosion of the shoreline and tidal inundation. Periodic inundation and erosion are natural processes and contribute to shaping the unique landforms of our coastal zone. However, when these processes have an adverse impact on communities, infrastructure and some natural assets, they are considered coastal hazards. In south-east Queensland, major coastal hazard impacts are typically associated with east coast lows (low pressure weather systems) and occasional tropical cyclones.

Storm Tide Inundation

Storm tide inundation is the flooding of low-lying coastal land from a locally elevated sea level (the 'storm tide'). The storm tide is a combination of the predicted tide, storm surge, and wave action (Figure 2). Storm surge is driven by the combined influence of low atmospheric pressure and high winds associated with events such as tropical cyclones.

Figure 2



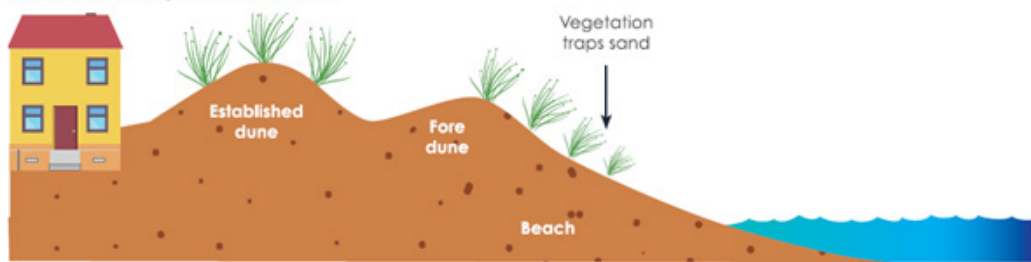
Coastal Erosion

Coastal erosion occurs when winds, waves and coastal currents act to shift sediment away from the shoreline. This can be a short-term shift, often associated with storm activity (termed storm bite), and the beach will then gradually rebuild. When a beach is stable, all of the sand moved offshore during a storm eventually moves back onto the beach (over timeframes of months to years). In this case periodic beach erosion does not result in a long term landward movement of the shoreline.

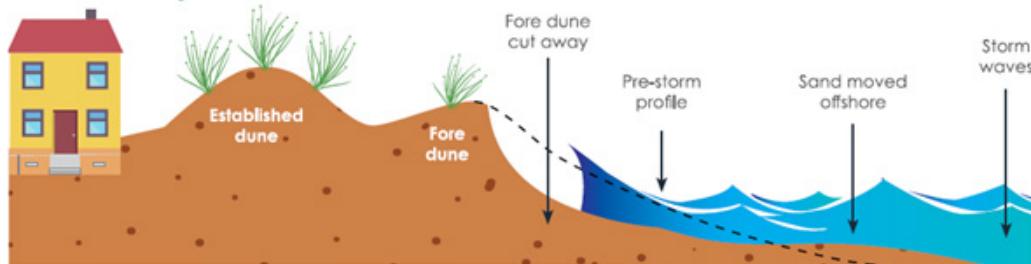
In other cases, due to changing sediment supply or climate conditions, the beach may not have sufficient capacity to rebuild between storm events. In the absence of intervention, long-term erosion (termed recession) may occur, which is the landward movement of the shoreline over a longer timeframe.

Both short term and long-term erosion processes may impact on coastal assets, depending on how close to the fore-dune assets are located.

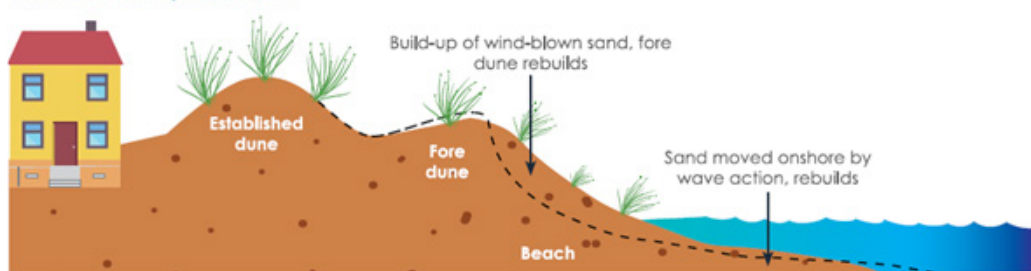
Normal beach shape, calm conditions



Beach erosion during storm



Beach and dune repair after storm



Tidal Inundation

Tidal inundation is regular inundation from the tidal cycle, including up to the Highest Astronomical Tide. Areas of low-lying coastal land will be prone to an increased extent of tidal inundation with sea level rise. A 0.8 m sea level rise by 2100 is currently planned for by the State Government.

As part of the CHAS preparation updated coastal hazard mapping has been produced. The updated maps are based upon new modelling of open coast erosion, a predicted sea level rise of 0.8m by 2100 and the application of the State Government approach to defining erosion prone areas, tailored to the Gympie region in consultation with State and the Local Government Association of Queensland (LGAQ). The mapping demonstrates modelling outputs for 2040, 2070 and 2100.

The updated mapping suggests that the area of urban land currently impacted by coastal hazards will increase by 100 per cent by 2100, largely as a product of sea level rise. It should be noted however that erosion prone areas and storm tide inundation zones do not represent a predicted loss of coastal land. The maps provide an indication of areas that may be exposed to erosion or inundation processes (now or in the future), it is expected that in many cases the impacts can be avoided, mitigated or managed through adaptation planning.

The mapping will inform the land use planning response to the issue of coastal hazards within the new planning scheme.

Desired outcome

- Coastal hazards are recognised, managed by mitigation and adaption so that the level of exposure is reduced.

Policy position

- The year 2100 is the planning horizon adopted to guide Council's land use planning response to coastal hazards.

Action

- The new planning scheme is drafted to reflect the desired outcome and policy position set out above.

Issue 3: Assets at Risk

Discussion

An asset is deemed to be at risk where it is identified to be at a medium to a very high risk of adverse impacts from coastal hazards. Risk is calculated via the risk matrix below, i.e. the risk level (low, medium, high or very high) is a product of the consequence of the hazard and the likely frequency of the hazard.

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Likely 10% AEP	Low	Medium	High	Very High	Very High
	Possible 1% AEP	Low	Medium	Medium	High	Very High
	Rare 0.2% AEP	Low	Medium	Medium	Medium	High

For infrastructure in the Cooloola coastal area, up to 10 per cent of roads are currently at risk from coastal hazards, increasing to 12 per cent by 2100. Sewerage, drainage and water reticulation assets currently have a relatively low risk, with less than two per cent of assets at risk, increasing to four per cent of assets at risk by 2100.

With respect to land use planning the CHAS modelling concludes that by 2100, 37 per cent of the open space (parks and the like) in the coastal area will be at a medium or higher risk from coastal erosion and about 25 per cent of residential land will be at medium to high risk of storm tide inundation at 1% AEP storm events.

Coastal hazard risk for residential dwellings at the present day is in the order of 20 dwellings across the whole region. By 2100, this may increase to over 100 dwellings in the at-risk zone for coastal hazards.

In the absence of intervention or adaptation, there are economic costs associated with coastal hazards. Economic analysis is important for determining the best approach to coastal hazard adaptation for different localities including:

- valuation of assets and key industries,
- establishment of a base case, i.e., the cost of no action, and
- assessment of adaptation options.

For the Cooloola Coast, the five key components of damages / losses have been identified for the base case:

- Damage to buildings and facilities –public and private buildings, and structures such as marinas and swimming pools, among others. This is the financial cost of repairing or replacing these assets.
- Damage to other infrastructure and facilities – such as electricity, sewerage, drainage, and water supply infrastructure.
- Damage to transport infrastructure – including roads, pathways, and bridges. This is the financial cost of repairing or replacing the assets and can also trigger other economic losses where access to key sites is lost.
- Losses of land, environmental and cultural assets – such as wetlands, national park, and habitats for threatened species. This is the lost value from a reduction of these assets.
- Damage to beach and foreshore assets – such as lifesaving towers, pontoons, jetties, playgrounds, shelters, and other beachside facilities.

For the Cooloola Coast, the present day average annual damages (AAD) associated with combined coastal

hazard impacts on infrastructure assets is estimated to be in excess of \$1 million dollars.

In the absence of adaption, this cost is likely to increase to \$6 million by 2040, \$9 million by 2070 and over \$11 million by 2100. The major driver of the cost increase will be damage to buildings caused by sea level rise.

The cost of damage to natural assets such as the beaches, wetlands and high ecological value waterways has been estimated to be in the order of an additional \$3.5 million annually by 2100.

Coastal hazards may also have the potential to impact upon beach access with flow on impacts for the local economy. Recent weather related beach closures have lasted several days. The potential economic impact on the local economy of a two week beach closure is estimated to be up to \$3.5 million.

From a land use planning perspective, the elements of the response to coastal hazards are:

- the identification of the extent of the hazard exposure and the associated risk levels,
- the review of land use suitability and risk tolerance to be reflected in land use zoning,
- clear identification of the at risk areas within the planning scheme mapping, and,
- the drafting of the appropriate planning scheme code requirements to mitigate risk to acceptable levels.

Desired outcome

- The planning scheme adaption responses reduce the impact of erosion and storm tide inundation upon future development.

Policy position

- Council adaptation framework is based upon four adaption responses:
 - Avoid placing new development in coastal hazard areas.
 - Where development is unavoidable in a coastal hazard area the development will, by design, mitigate the risk to an acceptable level.
 - Monitor areas of low risk and be prepared to adjust planning provisions should the risk profile be observed to increase.
 - Where the risk of coastal hazard is high and cannot be effectively mitigated, council will consider the transition to an alternative land use.

Action

- The new planning scheme be drafted to conform with the above policy setting.

Issue 4: Planning Scheme Adaption Response

Discussion

The CHAS has provided the background information to inform the planning scheme of the nature and extent of the exposure to coastal hazards within the Gympie local government area.

The task for the planning scheme is to set out an adaptation response to guide future land use and development decision making. Based upon the community engagement carried out as part of the preparation of the CHAS the objectives of the planning scheme response should be to:

- retain the natural beauty of the coast,
- limit adverse impacts on scenic amenity,
- protect important ecosystems,
- protect freshwater and tidal waterways and wetland habitats,
- maintain access to the region (including 4WD beach access),
- minimise potential impacts on tourism,
- retain sandy beaches,
- maintain access to beach and assets, and,
- limit impact on assets and infrastructure (including new developments) within hazard zone.

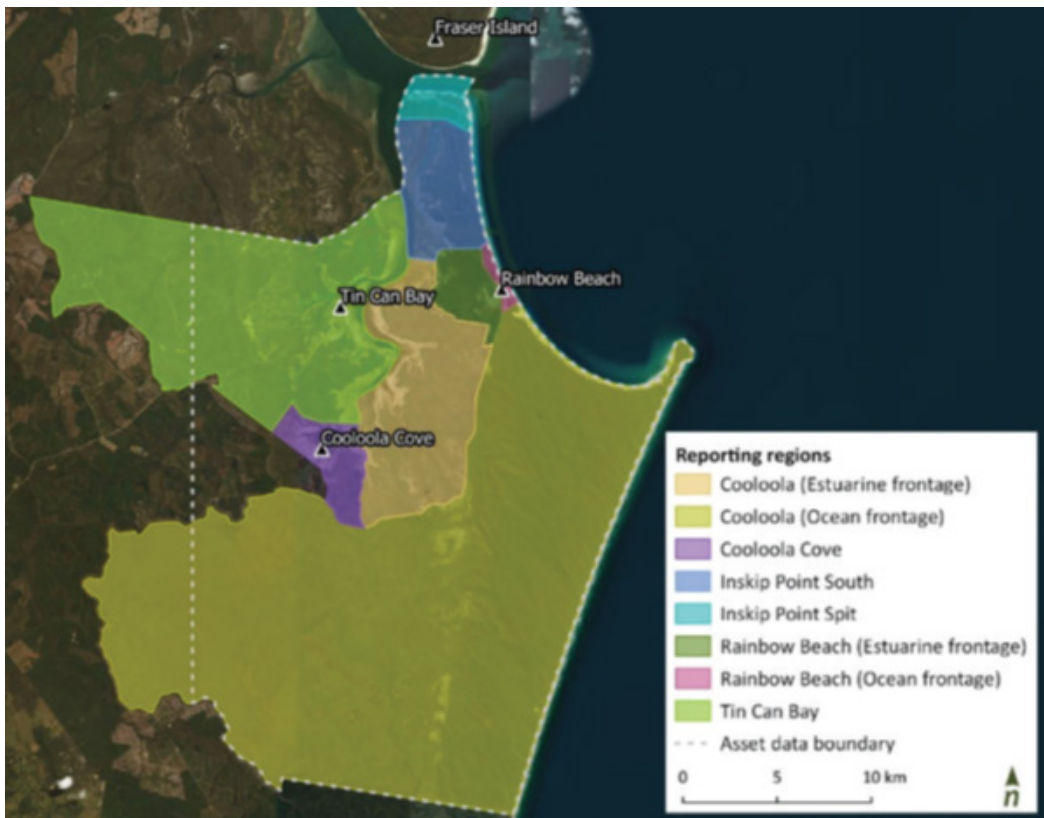
The challenge in drafting the planning scheme will be to establish a sustainable balance in achieving the sometimes competing objectives identified above.

As discussed at Issue 3, council's response framework can be generally described as:

- avoid
- monitor
- mitigate
- transition.

With respect to the planning scheme the CHAS flags the following actions:

- Develop a transition plan for Inskip Point, including consideration of an alternate barge access point.
- All planning matters undertaken by Council to incorporate and have regard to the new coastal hazard information presented in the CHAS.
- Consider implications of the CHAS for future development approvals and conditions including:
 - approval conditions for lots of undeveloped land with existing approvals
 - implications for future development approvals and conditions
- For the new planning scheme update, use the updated erosion prone area mapping and outcomes of the CHAS to inform decisions on development areas and strategic land use planning.



The CHAS provides some detail on the likely exposure and nominates specific actions for each of the localities identified above. This information is summarised below.

Cooloolool Cove

Given its sheltered location on the Tin Can Inlet and relatively low energy wave environment, inundation is expected to be the primary coastal hazard impacting Cooloolool Cove.

Inundation risk to built assets, residential areas and associated areas within the planning scheme is likely to remain low. However, present day tidal areas do extend to the fringes of undeveloped land parcels zoned for residential living near the outlet of Mullen Creek.

There is currently a relatively large area that is zoned as 'rural' between the built areas and Tin Can Inlet. Maintaining this as an ecological buffer will provide ecosystems with the opportunity to adapt/migrate and re-establish themselves as sea levels rise.

Planning response:

Review zoning and development approval conditions for undeveloped land with existing approvals.

Inskip Point South

Present day inundation and erosion risk is medium to high for some assets in low-lying areas, including the camp ground at Pelican Bay, access road to Inskip Point, and infrastructure (including the car park) at Bullock Point ferry terminal.

A large portion of this locality is currently under environmental management and this should be maintained to facilitate ecosystem adaptation.

A transition response for Bullock Point may be required by 2100 (subject to 10-year review). Infrastructure relocation and alternative barge landing locations may be required by 2100 due to the projected coastal hazard exposure and risk for this location. This can be considered in conjunction with transition planning for Inskip Point Spit.

Planning response:

Update planning scheme overlay mapping.

Inskip Point Spit

Inundation and erosion risk is moderate to high risk for roads and campgrounds and recreational uses at Inskip Point Spit. The entire spit is vulnerable to open coast erosion and dynamic estuarine processes at the present day, and coastal hazard risk is likely to increase to 2100.

The spit is a highly dynamic coastal feature that is vulnerable to major change at any point in time. The spit is not only vulnerable to open coast erosion and storm tide inundation but also estuarine process from the Inlet side and complex hydrogeomorphic changes including groundwater destabilisation (similar to past 'sink-hole events'). It is therefore anticipated that extremely rare events could cause a permanent breakthrough at any time that would result in a permanent loss of access to the northern point.

While there are limited built assets in this locality there are other implications, such as public safety and loss of access. The adaptation response for Inskip Point Spit is to begin the transition planning process. This may include maintaining the current land use until a specific trigger (erosion rate, breakthrough event or economic trigger) for changing land use and access arrangements occurs.

Emergency protection works are likely to continue as part of the transition plan to address minor / site specific erosion events for a period of time. However, the transition plan will enable proactive consideration of alternative future arrangements (e.g. alternative barge location, relocation of campground / recreational facilities).

Planning response:

Develop a transition plan for Inskip Point Spit. Planning needs to consider physical mechanisms of erosion (e.g. open coast erosion and sinkholes) as well as site specific economic analysis on the value of maintaining barge access to Fraser Island, value to tourism, and alternate locations for barge access.

Rainbow Beach (estuarine frontage)

This area contains a large portion of the Rainbow Beach community on the western side of Rainbow Beach Road and south of Clarkson Drive. This comprises local centres, residential and industrial areas, situated on the elevated hind-dune areas.

A significant portion of the remaining low lying land is zoned as environmental management and conservation except for an area at Carlo Point which contains the Carlo Point Marina and an area on the eastern side zoned as residential choice (currently contains Rainbow Beach Holiday Park).

For assets in the low-lying areas, tidal inundation and storm tide risk is expected to increase to 2100 with sea level rise. Existing land and assets in these zones can be upgraded through staged asset management to reduce the likelihood of exposure (e.g. raised lot and floor levels, or relocation of assets), or reduce the consequence of exposure (e.g. resilient building materials).

If feasible, adaptation measures should aim to integrate with existing asset management procedures to minimise any additional costs.

For new development areas, outcomes from the Strategy will be used to review zoning and development approval conditions to ensure coastal hazard risk is minimised.

Large areas of this locality are currently under environmental management and this should be maintained to facilitate natural ecosystem adaptation processes.

The adaptation response for Rainbow Beach (Estuarine frontage) is to monitor coastal hazards at present day and mitigate from 2040 onwards. Mitigation will include a combination of region-wide actions including planning updates and asset management upgrades.

A localised transition response may be required at the Carlo Point marina by 2100, which is likely to involve adaptation, including possible local relocation, of existing infrastructure. Planning for this would be reviewed in 2070 – not in the time horizon of this planning scheme.

Planning response:

Review zoning and development approval conditions for undeveloped land with existing approvals, clarify implications for future development approvals and conditions.

Rainbow Beach (ocean frontage)

This area includes the Rainbow Beach community on the eastern side of Rainbow Beach Road, and south of Clarkson Drive, as well as a small section of the Great Sandy National Park within the dune system south of Ocean View Parade.

The primary hazard for this area is open coast erosion, with the shoreline and dune system exposed to periodic erosion events at the present day and increasing exposure and risk by 2100.

Several council assets are located within the present day hazard area including beach access points, lifesaving tower and beach and foreshore facilities. Additional assets that may be at risk under future conditions include the surf lifesaving club, roads, pedestrian access, skate park, sewer, water and stormwater infrastructure and some park assets.

The adaptation response for Rainbow Beach (ocean frontage) is to mitigate coastal hazards from present day onwards. Mitigation includes a combination of region wide actions associated with capacity building, planning and modifying infrastructure, as well as a pilot of a dune protection and maintenance program, and the geotechnical and geomorphic assessments to inform future updates to the adaptation pathway.

Planning response:

No specific planning scheme response at this point other than to ensure the planning scheme overlay maps reflect the most up to date information for this area.

Tin Can Bay

This area includes the community of Tin Can Bay, a popular tourist destination, with hotels, holiday units, campgrounds, and caravan parks. It has a permanent population of around 2,000. The Tin Can Inlet itself is an important marine habitat area as well as servicing a fishing and prawning industry, along with recreational fishing.

The natural area north of Snapper Creek is zoned as community purpose and incorporates the Wide Bay defence training area. This area is largely inaccessible via road and includes extensive mangrove communities and estuarine wetlands.

The dominant coastal hazard exposure for Tin Can Bay is tidal and storm tide inundation, and localised areas of shoreline retreat. Inundation hazard risk is expected to increase for low-lying areas to 2100, with a notable increase in exposed assets by 2040.

The most at risk areas and assets are located between Crab Creek and Norman Point. Assets include residential dwellings, main access roads, sewer, water and stormwater infrastructure, pathways, car parking, amenities, waterfront open space, Tin Can Bay Marina, Tin Can Bay Swimming Pool, Coast guard, Barnacles Dolphin Centre and the Tin Can Bay Yacht Club.

There are areas of both developed and undeveloped land zoned as residential living and residential choice that may be increasingly exposed to inundation events by 2100. Extensive areas of high ecological significance may also be increasingly exposed to tidal and storm tide inundation events into the future. Maintaining existing ecological buffers to allow natural ecosystems the opportunity to migrate landward will be important for enabling natural adaptation.

The adaptation response for Tin Can Bay is to mitigate coastal hazards from present day through to 2040, and then plan for a land use transition at site specific localities including Norman Point by 2070.

Planning response:

Review zoning and development approval conditions for undeveloped land with existing approvals, clarify implications for future development approvals and conditions.

Desired outcome

- Future exposure to coastal hazards is minimised.

Policy positions

- In existing developed areas – mitigate ahead of staged transitions should monitoring show increasing risk.
- In undeveloped areas avoid new development that would be vulnerable to or exacerbate the effects of coastal hazards.

Actions

- Draft new planning scheme to reflect the locality specific actions identified above.
- Draft the new planning scheme to give effect to the policy position set out above.