

6. Coastal hazard adaptation actions

Saibai

Community overview

| Community | English name | Cluster | Type |
|-----------|--------------|----------|----------------------|
| Saibai | Saibai | Northern | Low lying mud island |

Saibai is one of three islands located in the northern cluster of the Torres Strait islands (Saibai, Boigu, and Dauan), and is also one of two flat mud islands found in the region. The island is just under 110 km² in size, with an approximate population of 340 people (ABS 2021) generally living in the main village on the northwest side.

Saibai is generally low-lying, as expected due to its geological composition, with mangrove forest on the outer edges of the island. The interior comprises a salt marsh environment with sparse vegetation. The township is of similar elevation to the rest of the island; however, its location to the north offers some protection from wind and wave conditions due to its proximity to Papua New Guinea (PNG). The island has been formed by an accumulation of mud and silt deposited on old coral platforms; however, active coral growth is likely suppressed by the impact of fluvial discharges from nearby rivers in PNG. Most of the sediments that make up the island are likely derived from fluvial rather than calcareous sources.

Key infrastructure on Saibai includes:

- Airport
- Regional council office
- Tagai Campus School (Years pre-prep to year 6)
- Health Centre with two permanent nurses
- IBIS grocery store
- Council workshop/compound
- SES shed
- Water plant reservoirs/filtration collection wells
- Power station
- Sewer plant
- Landfill site
- School accommodation
- Telecom tower
- Guest house
- Barge ramp
- Pier (small craft and passengers only)
- Saibai Community Development Corporation
- Customs office
- Rangers/customs shed
- Community centre
- Holy Trinity Church
- Cemetery
- Fuel bowser



Risk

The Saibai community is presently at very high risk from storm tide inundation, high risk from tidal inundation, and low risk from erosion. The low risk from erosion is due to the recently built seawall. The medium to long term erosion risk gets progressively higher as the seawall deteriorates with age. Without maintenance and eventually an upgrade, the erosion risk will increase. The Saibai community is very familiar with this risk which provides an element of resilience, however high risk conditions have been severe enough in the past to force a mass migration to the Northern Cape York Peninsula in Bamaga and Seisia, which occurred in the late 1940s (Saibai to Bamaga, 2000).




Coastal hazards risk profile for Saibai from present day to 2100

| Saibai Risk Profile | Present Day | 2050 | 2100 |
|-----------------------|-------------|-----------|-----------|
| Open coast erosion | Low | Medium | High |
| Tidal inundation | Very high | Very high | Very high |
| Storm tide inundation | Very high | Very high | Very high |

Adaptation response

A strategic adaptation response has been developed for Saibai to guide decision making over multiple planning horizons from present day to 2100. Based on the risk assessment and risk profiles for each hazard across the planning horizons, the present day adaptation response for Saibai is to actively manage identified risks, through a range of initiatives including education, nature based and structural engineering solutions. By 2050, the coastal hazard risk profile for Saibai will become too high and some active management options will no longer be feasible (due to economic or other factors), triggering a change into a 'transition' adaptation approach. At this time a broad range of adaptation options exist including engineering options, transition of current land use and relocating current assets to lower risk areas. A strategic decision will need to be made in consultation with the local community and consider the values of the Saibai area. The 'transition' adaptation pathway approach will continue to be implemented in 2100.

Adaptation response profile for Saibai

| Present day | 2050 | 2100 |
|--|--|--|
| <p>Actively manage</p>  | <p>Transition and change</p>  | <p>Transition and change</p>  |

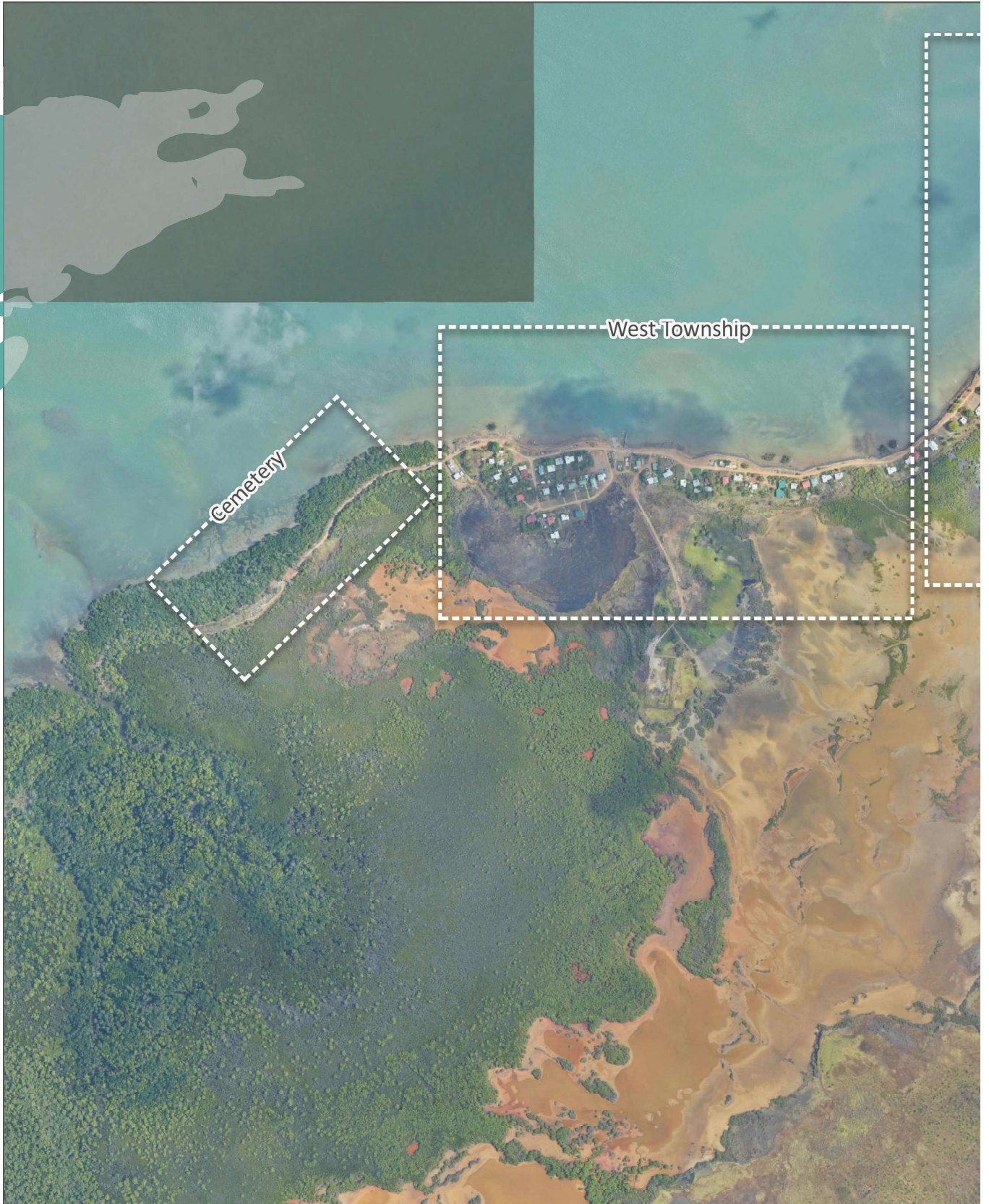
Adaptation pathways and priority actions

Key Management Areas (KMAs) have been defined based on which areas are most at risk, as well as feedback from community leaders and are mapped below. Tailored adaptation pathways for each key management area on Saibai are presented in the following pages.

Building on the outcomes of the risk assessment, adaptation response, and input from community leaders, specific priority adaptation actions have been developed to protect and enhance assets and coastal values in the Saibai community, as well as enhance community stewardship and improve decision-making. These actions are designed to progress the community along its adaptation pathways.



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Saibai

WEST AND NORTH EAST TOWNSHIP AREAS

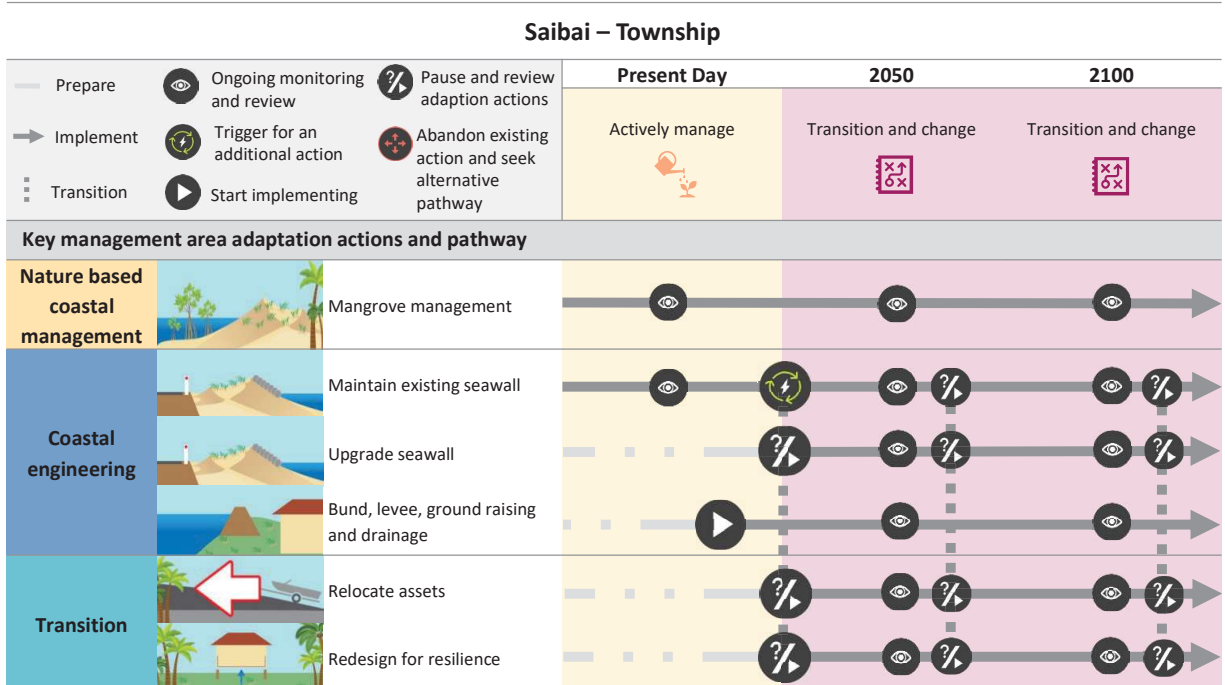
Overview of assets and values at risk

- The Saibai community already experiences significant issues with inundation during high tides and storm tides, and there is evidence of erosion along the shoreline.
- Majority of the township is forecast to be inundated by storm tides in present day conditions and this will occur more frequently as time goes on.
- The cemetery is protected by a bund wall so does not flood, however the access road, does, and it is eroding away.
- The new seawall along the length of the township includes a wave return wall to reduce wave overtopping during storm events.
- This seawall protects the township from storm tide inundation, but further work is required to determine whether the wall will be high enough to provide protection in the future.
- It is likely the seawall will need to be raised at some point in the future to provide the same level of protection as it does now.
- The community is very concerned about water inundating homes. This comes from low lying land from behind the township and rainfall mainly during monsoon season. Water can take 3-4 days to drain away from some homes.
- The forecast rise in sea level will make this worse in the future.



Pathway description

For the Township of Saibai, initial actions include maintaining the existing coastal protection structures supplemented by management. There are plans in place for bunds, ground raising and drainage to mitigate inundation. Once these protection measures are in place, the community will be faced with a decision to continue to maintain, and upgrade this infrastructure, or to develop a more detailed action plan involving relocating or redesigning the township for increased resilience, noting the cultural sensitivity of this decision. Relocating or redesigning the township should involve significant planning, consultation and innovation.



CEMETERY

Overview of assets and values at risk

Pathway description

In the Cemetery area of Saibai, the initial adaptation pathway for addressing coastal hazards involves actively managing the area through the maintenance of existing of bunds. As the community reaches trigger points, decisions will be made to determine the most desirable course of action, which may involve upgrading the infrastructure, developing a more detailed action plan involving relocating or redesigning the cemetery for increased resilience, noting the cultural sensitivity of this decision.



Saibai – Cemetery

| | | | Present Day | 2050 | 2100 |
|--|----------------------------------|--|------------------------|---------------------------|---------------------------|
| — Prepare | Ongoing monitoring and review | Pause and review adaption actions | Actively manage | Transition and change | Transition and change |
| → Implement | Trigger for an additional action | Abandon existing action and seek alternative pathway | | | |
| ⋮ Transition | Start implementing | | | | |
| Key management area adaptation actions and pathway | | | | | |
| Nature based coastal management | | Mangrove management | | | |
| | | Coastal engineering | Maintain existing bund | | |
| Transition | | Bund, levee, ground raising and drainage | | | |
| | | Relocate assets | | | |
| | | Redesign for resilience | | | |



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| Saibai Community Action Plan | | Indicative cost |
|---|---|-----------------|
| 1. Council-wide initiatives to enhance custodianship (Priority actions to be implemented within 10 years, and ongoing) | | |
| 1.1. Community stewardship | | |
| Saibai1.1a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |
| 1.2. Education and knowledge sharing | | |
| Saibai1.2a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |
| 1.3. Monitoring | | |
| Saibai1.3a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |
| 2. Planning updates (Priority actions to be implemented within 10 years, and ongoing) | | |
| 2.1. Land use planning | | |
| Saibai2.1a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |
| Saibai2.1b | Develop a "Priority Asset Relocation and Redesign Strategy" involving significant community consultation and input. This should identify potential new settlement zone on Saibai where a staged relocation of assets can occur. This plan should explore the opportunity for a "Floating Community", or an "Above Water Community". | \$\$ |
| 2.2. Disaster planning | | |
| Saibai2.2a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |



| Saibai Community Action Plan | | Indicative cost |
|---|--|-----------------|
| 3. Resilient built environment (Priority actions to be implemented within 10 years, and ongoing) | | |
| 3.1. Maintaining and improving infrastructure | | |
| Saibai3.1a | See Council wide actions. Consider how these actions can be effectively used in Saibai. | |
| 4. Nature based coastal management (see adaptation pathways for timing) | | |
| 4.2 Living shorelines | | |
| Saibai4.2a | Explore potential for a living shoreline to establish mangroves in the Township KMA. | \$\$ |
| 5. Coastal engineering (see adaptation pathways for timing) | | |
| 5.3 Last line of defence structures | | |
| Saibai5.3a | Continue to monitor and maintain existing coastal protection structures and develop plan to upgrade where needed. | \$\$ |
| 5.4 Structures to minimise flooding | | |
| Saibai5.4a | Proceed with plans to extend the bund wall around the south east side of the township, including around identified expansion areas cemetery. | \$\$\$ |



6. Coastal hazard adaptation actions

| Adaptation theme | Adaptation option | Action ID | 2023 Priority strategic actions (completed within 5 – 10 years) | Indicative cost | Timing | Priority |
|--|--------------------------------------|-----------|--|-----------------|---------|----------|
| 1. Council-wide initiatives to enhance custodianship | 1.1. Community stewardship | C1.1a | Establish a coastal resilience officer position within Council who will have responsibility over implementing the Zenadth Kes CHAS. This position will support Council's Climate Change Adaptation and Environment Committee and work closely with communities, across council and with other state and commonwealth agencies, streamlining and facilitating collaboration and effective implementation of adaptation actions. | \$\$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.1. Community stewardship | C1.1b | Seek co-funding/resources for further initiatives through grants and stakeholder partnerships. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.1. Community stewardship | C1.1d | Promote coastal custodianship in the youth and future generations with community coast care events. These should weave in cultural knowledge and the idea of Zagat Torateti. They can also include art, communication, and science programs focused on coastal resilience. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.1. Community stewardship | C1.1e | Establish and implement a dune and foreshore protection and maintenance program incorporating Zagat Torateti, access management, and community education. Support local communities in implementing this program. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.1. Community stewardship | C1.1f | Develop a dune and wetland vegetation seed bank for vegetation restoration efforts, involving Traditional Owners, Indigenous Land and Sea Rangers and schools. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.2. Education and knowledge sharing | C1.2a | Develop a Zenadth Kes CHAS - Communication and Engagement Strategy. This will support Council in working with communities to raise awareness of and implement their Community Adaptation Plans. This will use creative and innovative communication channels, leveraging emerging community leaders and content creators. It will outline the appropriate level and protocols of engagement and consultation needed for a range of adaptation actions. Ideally, this communication and engagement strategy should not stand alone but be integrated with Council's existing engagement policies and practices so that its relevance for all current and future development and supporting community resilience is continuously acknowledged. | \$ | Ongoing | High |

| Adaptation theme | Adaptation option | Action ID | 2023 Priority strategic actions (completed within 5 – 10 years) | Indicative cost | Timing | Priority |
|--|--------------------------------------|-----------|---|-----------------|---------|----------|
| 1. Council-wide initiatives to enhance custodianship | 1.2. Education and knowledge sharing | C1.2b | Develop locally and culturally appropriate educational materials about coastal processes, climate change, monitoring and adaptation with a focus on nature based management and innovative and island-appropriate design and development. Integrate these materials into the implementation of the Zenadth Kes CHAS - Communication and Engagement Strategy (action C1.2a). | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.2. Education and knowledge sharing | C1.2c | Work with organisations like the TSRA, CSIRO, Universities, Non-Profits, and the Torres Strait Climate Centre of Excellence to support further research and innovation into coastal hazard and climate change adaptation. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.2. Education and knowledge sharing | C1.2d | Continue to advance partnerships and collaboration with Traditional Owners to further consider needs and aspirations for Aboriginal and Torres Strait Islander People in coastal hazard adaptation. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.2. Education and knowledge sharing | C1.2e | Promote cross-sector partnerships and initiatives to enhance resilience and strategic adaptation for transport infrastructure, including boating infrastructure. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3a | Develop a tailored integrated monitoring and reporting program to inform future adaptation. Incorporates actions C1.3b-h. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3b | Undertake drone survey (elevation and aerial imagery) monitoring of beaches. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3c | Undertake underwater coral reef surveys to map the extent and condition. Explore the use of photogrammetry to create detailed 3D models of reefs. | \$\$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3d | Establish a network of water level gauges throughout the TSIRC regions. Train community members to operate and maintain them. | \$\$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3e | Undertake regular coastal protection structure condition assessments. | \$ | Ongoing | High |

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|--|--------------------------|-----------|---|-----------------|----------------|----------|
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3f | Establish a monitoring program for sites of cultural significance that measures indicators such as spiritual/social value, archaeological value, physical condition, and protection of sites. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3g | Establish a system of Citizen Science photo monitoring points (CoastSnap, Fluker Post or similar) at beaches in the area. | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3h | Create a platform/process with Council for monitoring data storage and management | \$ | Ongoing | High |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3i | Undertake detailed sediment supply and transport studies for coral cay islands and lagoons. | \$\$ | Within 5 years | Medium |
| 1. Council-wide initiatives to enhance custodianship | 1.3. Monitoring | C1.3j | Review and further examine the sediment dynamics around TSIRC communities and the shoreline including: <ul style="list-style-type: none"> · Geomorphic assessment · Hydrodynamic modelling · Shoreline Erosion Management Plan. Linked to C1.3i | \$ | Ongoing | High |
| 2. Planning updates | 2.1. Land use planning | C2.1a | Submit updated Erosion Prone Area layers to State Government for formal update to the existing State-wide mapping. | \$ | Immediate | High |
| 2. Planning updates | 2.1. Land use planning | C2.1b | Use the updated Erosion Prone Area and storm tide mapping and outcomes of the Zenadth Kes CHAS in current and future Planning Scheme and Master Plan updates to inform decisions on development areas and strategic land use planning. | \$ | Ongoing | High |
| 2. Planning updates | 2.1. Land use planning | C2.1c | Consider implications (within Council) of the Strategy for future development approvals and conditions, including: <ul style="list-style-type: none"> · Approval conditions for lots of undeveloped land, and · Implications for future development approvals and conditions. | \$ | Ongoing | High |
| 2. Planning updates | 2.2. Disaster management | C2.2a | Use the updated Erosion Prone Area and storm tide mapping, risk assessment and economic implications to update the TSIRC Local Disaster Management Plan. Ensure local community input is used to inform the updated plan. | \$ | Within 5 years | Medium |
| 2. Planning updates | 2.2. Disaster management | C2.2b | Review the long-term adequacy of evacuation and shelter facilities and evacuation routes, including evacuation by land and sea. | \$ | Ongoing | High |

| Adaptation theme | Adaptation option | Action ID | 2023 Priority strategic actions (completed within 5 – 10 years) | Indicative cost | Timing | Priority |
|-----------------------------------|---|-----------|---|-----------------|-----------|----------|
| 3. Resilient built infrastructure | 3.1. Increasing infrastructure resilience | C3.1a | Review at-risk infrastructure (from CHAS data outputs) and embed risks into current asset management plans/Master Plan (this could include 'betterment' at critical asset refurbishment/renewals points). | \$ | Ongoing | High |
| 3. Resilient built infrastructure | 3.1. Increasing infrastructure resilience | C3.1b | Review access road renewals and upgrades (prioritisation), and upgrade design requirements and timing of upgrades. | \$ | Ongoing | High |
| 3. Resilient built infrastructure | 3.1. Increasing infrastructure resilience | C3.1c | Produce "Resilient Housing and Development Guidelines and Designs" tailored to the Torres Strait Islands. This should cater to all island types. Community knowledge holders, elders and leaders should be heavily consulted for this process. | \$\$ | Ongoing | High |
| 3. Resilient built infrastructure | 3.1. Increasing infrastructure resilience | C3.1d | Consult with utility providers on future services and upgrades, and implications of coastal hazard areas. | \$ | Ongoing | High |
| 3. Resilient built infrastructure | 3.1. Increasing infrastructure resilience | C3.1e | Audit stormwater assets in areas subject to erosion and inundation, and develop plan to upgrade in line with refurbishment/renewals points. | \$\$ | Ongoing | High |
| 3. Resilient built infrastructure | 3.2. Relocate infrastructure | C3.2a | Develop "Priority Asset Relocation and Redesign Guidelines" to assist communities in developing island specific relocation strategies. Community knowledge holders, Elders, other leaders and young people should be heavily consulted for this process. Factors to consider include: Approvals Native Title Hazards Master Plan Town Planning | \$ | Immediate | High |

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| Adaptation theme | Adaptation option | Action ID | 2023 Priority strategic actions (completed within 5 – 10 years) | Indicative cost | Timing | Priority |
|------------------------------------|---|-----------|---|-----------------|----------------|----------|
| 4. Nature-based coastal management | 4.1. Dune, mangrove and reef protection and enhancement | C4.1a | Support local communities in re-establishing, rehabilitating, or protecting coastal dunes | \$ | Ongoing | High |
| 4. Nature-based coastal management | 4.1. Dune, mangrove and reef protection and enhancement | C4.1b | Support local communities in re-establishing, rehabilitating, or protecting mangroves | \$ | Ongoing | High |
| 4. Nature-based coastal management | 4.1. Dune, mangrove and reef protection and enhancement | C4.1c | Support local communities in re-establishing, rehabilitating, or protecting coral reefs | \$ | Ongoing | High |
| 4. Nature-based coastal management | 4.1. Dune, mangrove and reef protection and enhancement | C4.1d | Scope the feasibility and priority locations for natural reef enhancement activities, requiring comprehensive knowledge of the latest scientific findings and methodologies to ensure effective implementation and multiple benefit outcomes. | \$\$ | Within 5 years | Medium |
| 4. Nature-based coastal management | 4.2. Living shorelines | C4.2a | Develop a detailed "Living Shorelines Design and Implementation Plan" to prioritise and support the communities where a living shoreline has been determined as a feasible option. | \$\$ | Within 5 years | Medium |
| 4. Nature-based coastal management | 4.2. Living shorelines | C4.2b | Develop a detailed "Artificial Reef Design and Implementation Plan" to prioritise and support the communities where an artificial reef has been determined as a feasible option. | \$\$ | Within 5 years | Medium |
| 4. Nature-based coastal management | 4.3. Beach nourishment | C4.3a | Develop a detailed "Beach Nourishment Design and Implementation Plan" to prioritise and support the communities where beach nourishment or sand management has been determined as a feasible option. | \$\$ | Within 5 years | Medium |

| Adaptation theme | Adaptation option | Action ID | 2023 Priority strategic actions (completed within 5 – 10 years) | Indicative cost | Timing | Priority |
|------------------------|---|-----------|--|-----------------|---------|----------|
| 5. Coastal engineering | 5.1. Structures to reduce coastal hazards | C5.1a | Continue to implement the Seawall Project. | \$\$\$ | Ongoing | High |
| 5. Coastal engineering | 5.1. Structures to reduce coastal hazards | C5.1b | Continue to monitor and maintain existing coastal and flood protection structures. | \$\$\$ | Ongoing | High |
| 5. Coastal engineering | 5.1. Structures to reduce coastal hazards | C5.1c | Audit coastal and flood protection assets, and develop plan to upgrade where needed. | \$ | Ongoing | High |

