

6. Coastal hazard adaptation actions

Kirriiri

Community overview

Community	English name	Cluster	Type
Kirriiri	Hammond	Southern	Continental volcanic and granitic rock island

Kirriiri is located in the southern cluster of Torres Strait islands, to the west of Waibene (Thursday Island). The island is approximately 15 km² and has a population of approximately 261 people (ABS, 2021). Kirriiri can be classified as a continental type is land with geology similar to that found on mainland Australia.

The majority of the community live in the main township, which is located in a narrow valley between two areas of high elevation. To the north the landscape rises to over 150 m above sea level. To the south of the township the peak elevation is lower, at just over 100 m above sea level. The main beach adjacent the township is approximately 900 m long, runs in a north-south orientation, and has a non-engineered seawall running the entirety of its length. North of the main beach, the coastal strip extends approximately 1.3 km along bays and small headlands.

Key infrastructure on Kirriiri includes:

- Regional council office
- Catholic primary school (years pre-prep to year three)
- Child day care facility
- Small convenience store
- Sporting facilities – indoor and outdoor multi-purpose courts, rugby league oval
- Council workshop/compound
- SES shed
- Water plant reservoirs/filtration collection wells
- Power station
- Barge ramp
- Pier (small craft and passengers only)
- Refuel facility (solar powered) diesel and petrol



Risk

The Kirriri community is currently considered medium to low risk from coastal hazards, with the risk not significantly increasing within the planning horizon of this strategy. Some assets in the community are at risk from erosion but protected from non-engineered structures which will lose efficacy over time leading to an increased risk from erosion.




Coastal hazards risk profile for Kirriri from present day to 2100

Kirriri Risk Profile	Present Day	2050	2100
Open coast erosion	Medium	Medium	High
Tidal inundation	Low	Low	Medium
Storm tide inundation	Low	Low	Medium

Adaptation response

A strategic adaptation response has been developed for Kirriri 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 adaptation response for Kirriri is to “monitor” through observing changes to individual asset’s capacity to withstand hazards and reviewing risk, with the approach being implemented in the present day and into 2050. By 2100, increased risk will trigger the adaptation response to actively manage identified risks, through a range of initiatives including education, nature based and structural engineering solutions.

Adaptation response profile for Kirriri

Present day	2050	2100
Monitor (look and learn) 	Monitor (look and learn) 	Actively manage 

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 Kirriri 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 Kirriri community, as well as enhance community stewardship and improve decision-making. These actions are designed to progress the community along its adaptation pathways.



6. Coastal hazard adaptation actions





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Kiriri

NORTHERN TOWNSHIP

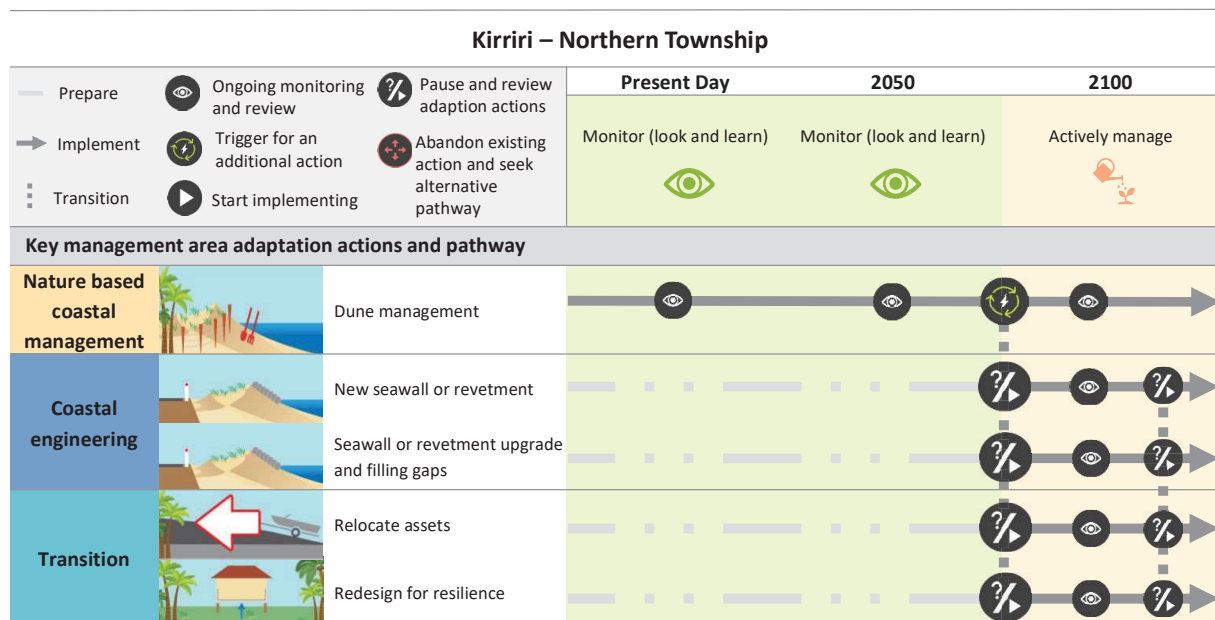
Overview of assets and values at risk

- The northern beaches have several residences and informal structures, with the shoreline broken up into several bays between rocky headlands.
- The majority of the beaches have informal seawalls, but most are in a state of disrepair and are of varying elevation.
- The large stream discharging just north of Raehome point is the largest along the eastern side of the island.
- The study shows that, to the north of Raehome Point, there is a mixture of erosion and accretion with one erosion hotspot where it appears that there has been some clearing of the mangrove fringe.
- Previous reports have indicated that the community are aware that the non-engineered seawall has caused the adjacent beach slope to be very low and flat. This has resulted in loss of beach amenity such that there is no dry beach area during high tides. However, the seawall has halted the natural erosion processes, and has maintained the shoreline in its current location.



Pathway description

In Kiriri's Northern Township, the adaptation pathway begins with dune management. As trigger points are reached, the community can opt to upgrade existing seawalls and revetments, filling gaps for added protection against coastal hazards. The trigger points will also be a chance to consider relocating structures or redesigning them for resilience. Throughout the process, ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone areas.



SOUTHERN TOWNSHIP

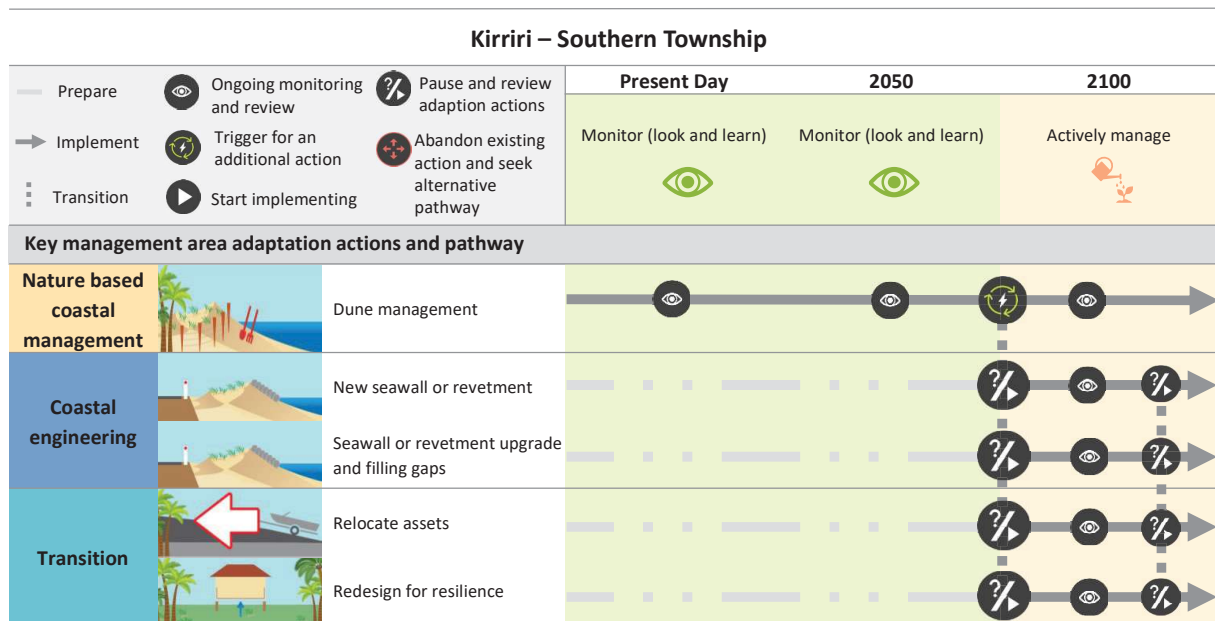
Overview of assets and values at risk

- This area has experienced erosion along most of its length except for a small area at the southern end.
- There is a small non-engineered seawall along the length of the beach, however, without adequate maintenance and strengthening measures, it is unlikely to be an effective erosion protection measure for the town into the future.
- This low structure does not offer significant protection from high water levels or inundation, and due to the seawall, the beach is very low and flat and generally does not have any dry sand during high tides. Concern has previously been expressed in regard to further inundation or erosion of the cemetery towards the northern end of the beach.
- The study shows an overall erosion trend along the town beach south of Raehome Point with some minor accretion at the southern end, indicating an overall loss of sand under the influence of easterly waves and tidal currents and the presence of the seawall.



Pathway description

In the Southern Township on Kirri, the adaptation pathway begins with dune management. As trigger points are reached, the community can opt to upgrade existing seawalls and revetments, filling gaps for added protection against coastal hazards. The trigger points will also be a chance to consider relocating structures or redesigning them for resilience. Throughout the process, ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone areas.



6. Coastal hazard adaptation actions

KIRRIRI 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		
Kirriri1.1a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
1.2. Education and knowledge sharing		
Kirriri1.2a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
1.3. Monitoring		
Kirriri1.3a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
2. Planning updates (Priority actions to be implemented within 10 years, and ongoing)		
2.1. Land use planning		
Kirriri2.1a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
Kirriri2.1b	Consider establishment of a stone quarry to provide materials for coastal protection throughout the Torres Strait.	\$\$
2.2. Disaster planning		
Kirriri2.2a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
3. Resilient built environment (Priority actions to be implemented within 10 years, and ongoing)		
3.1. Maintaining and improving infrastructure		
Kirriri3.1a	See Council wide actions. Consider how these actions can be effectively used in Kirriri.	
Kirriri3.1b	Consider relocation or redesign for resilience of buildings (in line with the Resilient Housing and Development Guidelines and Designs from action C3.1c) exposed to erosion in the Northern and Southern Township KMAs.	\$\$



Kiriri Community Action Plan		Indicative cost
4. Nature based coastal management (see adaptation pathways for timing)		
4.1 Dune, mangrove and reef protection and enhancement		
Kiriri4.1a	Identify degraded dunes in all Key Management Areas. Protect and enhance them using local knowledge and Zaget Torateti, including the use of native dune plants, and other stabilising vegetation. Manage access for an appropriate time period to allow vegetation to establish.	\$
4.3 Beach nourishment		
Kiriri4.3a	Consider small scale beach nourishment or sand scraping to enhance degraded dunes in front of key assets. Supplement with dune restoration and access management, see action Kiriri4.1.a.	\$\$
5. Coastal engineering (see adaptation pathways for timing)		
5.3 Last line of defence structures		
Kiriri5.3a	Continue to monitor and maintain existing coastal protection structures and develop plan to upgrade where needed.	\$\$
Kiriri5.3b	As part of the adaptation pathway in the Northern KMA, consider the construction of a coastal protection structure to protect exposed houses. This action should not occur before Kiriri3.1b, Kiriri4.1a and Kiriri4.3a are considered.	\$\$
5.4 Structures to minimise flooding		
Kiriri5.4a	Assess the need for and feasibility of a bund along the western side of the Southern Township KMA near where potential residential expansion is being considered.	\$\$



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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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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

