

6. Coastal hazard adaptation actions

Poruma

Community overview

Community	English name	Cluster	Type
Poruma	Coconut	Central	Coral Cay

Poruma, located in the central island cluster, is a low-lying coral cay which is home to approximately 164 people (ABS, 2021). The long narrow shape is distinctive of this island type in the Torres Strait region and suggests a strong west to east longshore current driving the growth of the island. Poruma is approximately 0.5 km² in size, making it one of the most densely populated Torres Strait islands.

Vegetation on the island is predominantly low grasses and coconut trees. The island is a typical coral cay, having developed on the north western side of the platform reef about 3000 years ago (JCU, 2010). The morphology of the island is relatively flat, with a beach rock substrate and a high dune system on the southern shoreline providing protection from Sager winds (southeast seasonal winds). These winds are the main drivers of the formation of the cay, and small seasonal variations in the strength and direction of the Sager winds will affect the shape and orientation of the cay resulting in cycles of erosion and

accretion of the beaches, particularly at the eastern and western ends of the island.

Key infrastructure on Poruma includes:

- Airport (including helipad)
- Council office
- State school (year pre-prep to year 6)
- Health centre with permanent nurse
- Two grocery stores
- Sporting facilities - multipurpose outdoor court, sports oval
- Council workshop/compound
- SES shed
- Water plant reservoirs/filtration collection wells
- Ergon power station
- Barge ramp with small pier
- Seafood (Crayfish) factory
- Landfill site



Risk

The Poruma community is presently considered low to high risk from inundation and very high risk from erosion. There are existing and planned coastal protection structures around the island to address this risk. The risk from storm tide inundation is expected to increase to high risk in the medium to long term planning horizons of this strategy.




Coastal hazards risk profile for Poruma from present day to 2100

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

Adaptation response

A strategic adaptation response has been developed for Poruma 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 Poruma 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 Poruma 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 or redesigning current assets to lower risk. A strategic decision will need to be made in consultation with the local community and consider the values of the Poruma area. The 'transition' adaptation pathway approach will continue to be implemented in 2100.

Adaptation response profile for Poruma

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

Adaptation pathways and priority actions

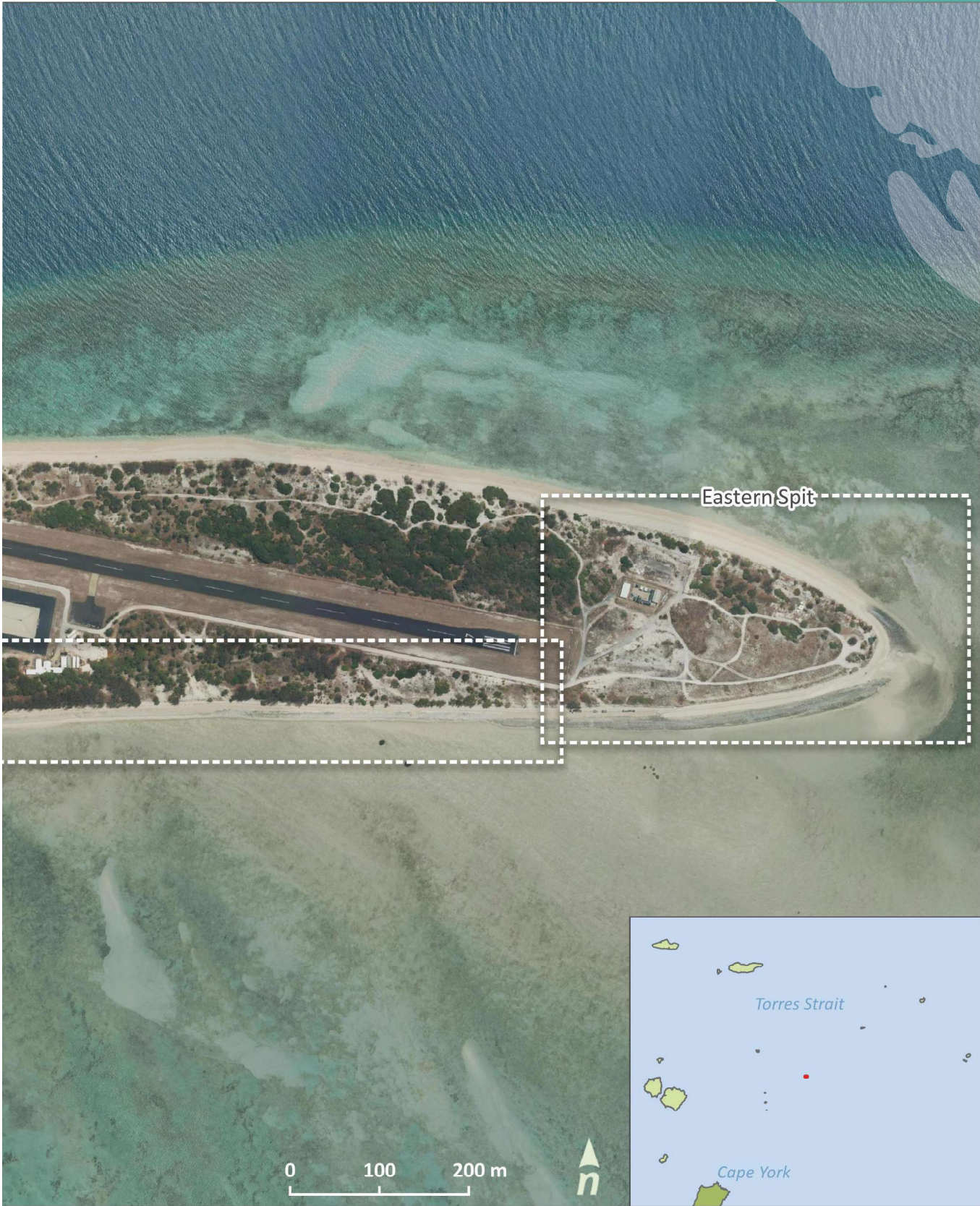
Key Management Areas (KMAs) have been defined based on which areas are most at risk, as well as feedback from community leaders and are mapped below. Tailored adaptation pathways for each key management area on Poruma are presented in the following pages.

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 Poruma 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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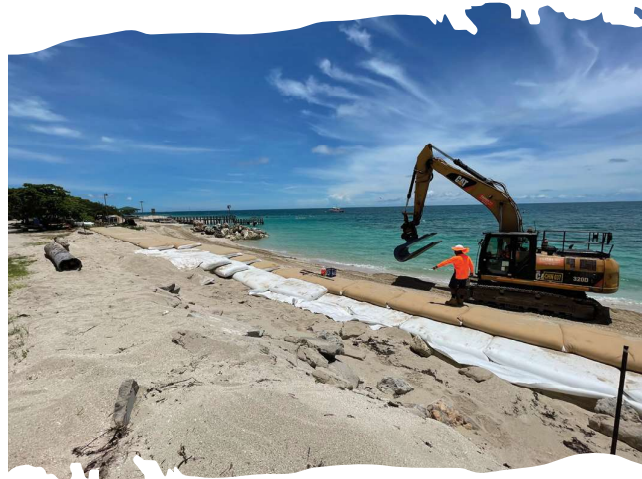
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JETTY AND NORTH TOWNSHIP

Overview of assets and values at risk

- This area is protected from erosion by the revetment, but water does inundate the area during king tides and storm tides.
- Previously, the community wanted the wall to be repaired and extended slightly seawards near the barge ramp groyne to provide more room for the foreshore road. These works were completed in 2021.
- The community also said previously it wanted to investigate installing a culvert or pilling of the barge ramp when it is due for replacement, to reinstate natural sand movement in the area.



Pathway description

In Poruma’s jetty and north township, the adaptation pathway begins with dune management and maintaining the existing structures around the jetty. The community is already actively managing coastal hazards by the recent construction of a seawall that protects the buildings and north end of the airstrip. Moving forward, the community will need to decide whether to continue to maintain and upgrade the protection structures, relocate or redesign assets. Input into this decision will involve consideration of sea level rise, and coral island geomorphology and sediment dynamics. Ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone areas.

Poruma – Jetty and North Township

			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		Dune management			
	Coastal engineering	Maintain existing protection structures			
New seawall or revetment					
Transition	Relocate assets				
	Redesign for resilience				

EASTERN SPIT

Overview of assets and values at risk

- The area is currently subject to erosion, permanent inundation from sea level rise and storm tide.
- The study indicates the sewerage and waste infrastructure at the Eastern end, NE of aerodrome and the gazebo could be at risk in the future.
- Previously the community said it would re-locate the gazebo or rebuild a movable gazebo further inland if necessary.
- GSC seawall has recently been constructed to mitigate erosion impacting the sewerage and waste infrastructure.
- The community previously said it wanted hazardous materials in waste pits to be managed appropriately because it may move because of erosion.
- The community also wants Council to remove the concrete rubble placed on the beach and for future dumping of more rubble to be discouraged.



Pathway description

For the eastern spit of Poruma, the initial adaptation strategy includes dune management including removing concrete rubble, preventing more from being disposed, and fostering native dune vegetation regeneration. In response to sea level rise, new seawalls or revetments, bunds, ground raising, and drainage are planned for construction to further protect the sewerage and waste infrastructure. The community has also noted that the gazebo can be relocated or redesigned to be moveable. Throughout the process, ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone areas.

Poruma – Eastern Spit				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		Dune management	👁️	👁️	👁️	➔
Coastal engineering		New seawall or revetment	▶️	⚡	👁️	➔
		Bund, levee, ground raising and drainage (around sewerage and waste infrastructure)	⋮	⏸️	👁️	⏸️
Transition		Relocate assets (gazebo)	⋮	⏸️	👁️	⏸️
		Redesign for resilience	⋮	⏸️	👁️	⏸️



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SOUTHERN BEACH

Overview of assets and values at risk

- This has a high dune system protecting the area from seasonal weather changes, permanent inundation and storm tide.
- The beach is however, experiencing erosion at the eastern end. Materials (tyres) have been used as informal attempts to mitigate erosion.
- Previously, the community wanted to monitor the erosion and take further action if it got worse.
- The community wants to see a management plan in place to avoid blowouts, limit tracks and maintain vegetation.
- The community says large tyres protecting part of the dune were removed some years ago. They worked well and would like tyres or a similar considered for future protection of that area.



Pathway description

At Poruma’s southern beach, initial actions involve dune management. Moving forward, the community will need to decide whether to construct protection structures, relocate or redesign assets. Ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone zones.

Poruma – Southern Beach				Present Day	2050	2100
— Prepare	Ongoing monitoring and review	Pause and review adaptation 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		Dune management				
Coastal engineering		New seawall or revetment				
Transition		Relocate assets				
		Redesign for resilience				



WESTERN SPIT

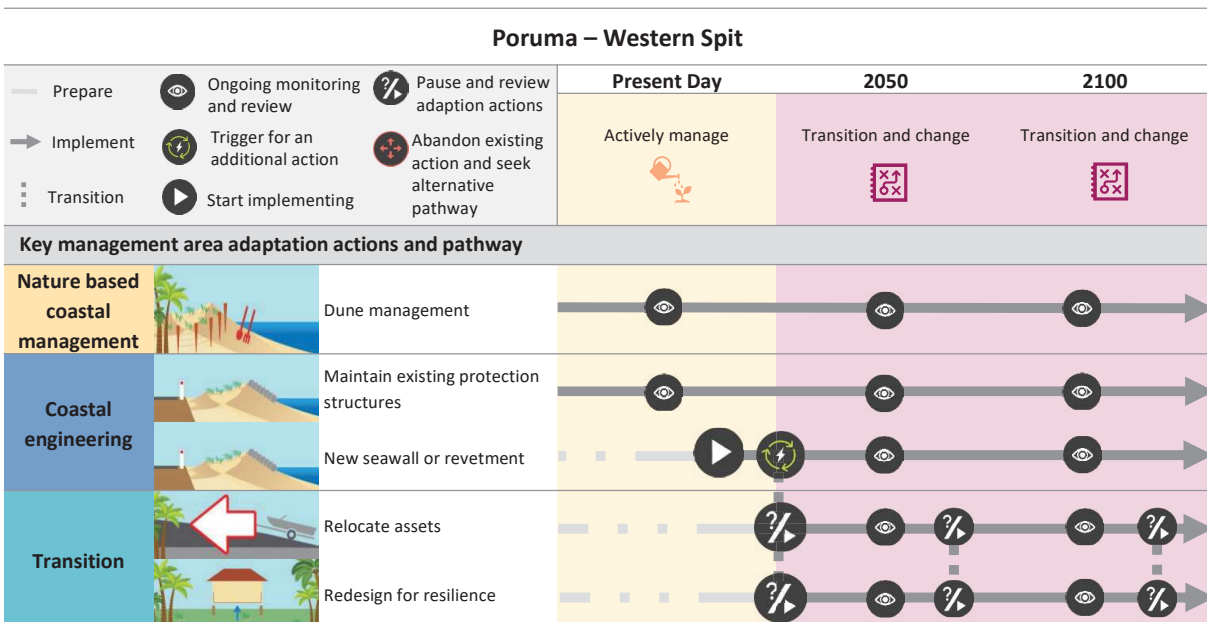
Overview of assets and values at risk

- This area has been eroding for many seasons, particularly on the southern side. Geotextile Sand Containers (GSCs), often referred to as sandbags, were installed in 2016 to protect the resort but erosion is likely to continue around the ends of the GSC wall in the future. Erosion may also impact the township if the erosion continues.
- The resort and township are both impacted by storm tides now and may be impacted more frequently in the future.
- Previously, the community has said it wants to stop the erosion as soon as possible. GSC seawalls are planned for this area to mitigate erosion. Stages 2 and 3 are expected to be completed by the end of 2020 and Stages 4 and 5 in 2021.
- The community also understands with a seawall there is unlikely to be dry sand in front when the tide is above the level of the reef flat.
- The community agrees revegetating the sand spit on the north west corner will help stabilise sand accumulation in this area.



Pathway description

For the western spit of Poruma, the adaptation pathway begins with dune management and maintaining the existing geobag structures. There are plans for the community to actively manage coastal hazards by constructing a new seawall extension that will offer additional protection. Moving forward, the community will need to decide whether to continue to maintain and upgrade the protection structures, relocate or redesign assets. Input into this decision will involve consideration of sea level rise, and coral island geomorphology and sediment dynamics. Ongoing custodianship and monitoring should be maintained, avoiding new development in hazard-prone areas.



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Poruma 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		
Poruma1.1a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
Poruma1.1a	Remove concrete rubble from Eastern Spit KMA and discourage future dumping.	
1.2. Education and knowledge sharing		
Poruma1.2a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
1.3. Monitoring		
Poruma1.3a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
2. Planning updates (Priority actions to be implemented within 10 years, and ongoing)		
2.1. Land use planning		
Poruma2.1a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
Poruma2.1b	Develop a “Priority Asset Relocation and Redesign Strategy” involving significant community consultation and input. This should identify potential new settlement zone on Poruma 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		
Poruma2.2a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
3. Resilient built environment (Priority actions to be implemented within 10 years, and ongoing)		
3.1. Maintaining and improving infrastructure		
Poruma3.1a	See Council wide actions. Consider how these actions can be effectively used in Poruma.	
Poruma3.1b	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 hazards in all KMAs.	\$\$

Poruma Community Action Plan		Indicative cost
4. Nature based coastal management (see adaptation pathways for timing)		
4.1 Dune, mangrove and reef protection and enhancement		
Poruma4.1a	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.	\$
4.2 Living shorelines		
Poruma4.2a	Explore feasibility of an artificial reef to enhance fringing reef resilience, bolstering natural sediment supply and dissipating wave energy.	\$\$
4.3 Beach nourishment		
Poruma4.3a	Monitor beach profiles around the island and consider sand backpassing around the barge ramp or beach nourishment to enhance degraded dunes in front of key assets. Supplement with dune restoration and access management, see action Poruma4.1.a	\$\$
5. Coastal engineering (see adaptation pathways for timing)		
5.3 Last line of defence structures		
Poruma5.3a	Continue to monitor and maintain existing coastal protection structures and develop plan to upgrade where needed.	\$\$
Poruma5.3b	Proceed with plans to construct coastal protection structures to prevent erosion and inundation in the Jetty and North Township KMA in front of houses and the airstrip.	\$\$\$
5.4 Structures to minimise flooding		
Poruma5.4a	Consider construction of a bund around the waste facilities in the Eastern Spit KMA.	\$\$\$



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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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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

