

6. Coastal hazard adaptation actions

Arkai (Moa Kubin)

Community overview

Community	English name	Cluster	Type
Arkai	Moa (Kubin)	Western	Continental volcanic and granitic rock island

Arkai (Kubin Community) is one of the two townships on Moa. It is located on the south western coast and has an estimated population of 156 people (ABS, 2021). The other township, Wug (St Pauls) is located on the eastern coast of the island, with the townships connected via an inland road.

Moa, located in the western island cluster and approximately 170 km² in size, can be classified as a continental island with geology similar to that found on mainland Australia. The majority of the community live in the main township, predominately located on an elevated headland adjacent the coast. The elevation of this headland generally exceeds +5 m Australian height datum (AHD); however this elevation falls away towards the aerodrome to the north. The position of the township on the south-western corner of Moa and an elevated headland to the east provides protection from strong seasonal winds and waves from the south east.

Some of the key infrastructure in Arkai include:

- Airport
- Regional council office
- State school (years pre prep to 7)
- Health centre with permanent nurse
- IBIS grocery stores
- Indigenous Arts Centre
- Sporting Facilities - outdoor multipurpose courts, sports field
- Motel - four rooms
- Refuel facility
- Council workshop/ compound
- SES shed
- Water plant reservoirs/ filtration collection wells
- Power station
- Barge ramp
- Pier (small craft and passengers only)



Risk

The Arkai (Moa Kubin) community is currently considered low risk from coastal hazards, with the risk not significantly increasing within the planning horizon of this strategy.




Coastal hazards risk profile for Arkai (Moa Kubin) from present day to 2100

Arkai (Moa Kubin) Risk Profile	Present Day	2050	2100
Open coast erosion	Low	Low	Low
Tidal inundation	Low	Low	Medium
Storm tide inundation	Low	Low	Medium

Adaptation response

A strategic adaptation response has been developed for Arkai 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 Arkai is to avoid creating new assets in hazard areas and maintain current assets, with the approach being implemented in the present day and into 2050. By 2100, increased risk will trigger the adaptation response to “monitor” through observing changes in individual asset’s capacity to withstand hazards and reviewing risk.

Adaptation response profile for Arkai (Moa Kubin)

Present day	2050	2100
Avoid (and maintain) 	Avoid (and maintain) 	Monitor (look and learn) 

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 Arkai 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 Arkai 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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MAIN BEACH

Overview of assets and values at risk

Main Beach

- This area is not at risk due to permanent inundation due to sea level rise or storm tide inundation as most infrastructure is built well back from the coast. The beach area is however, in a coastal erosion zone.
- Key assets in the coastal erosion zone which could be impacted in the future include the aerodrome (north western end of the runway) and the cemetery.



Main Beach at Low Point

- The study found this area is not at risk of inundation from sea level rise or storm tide but may be impacted by coastal erosion.

Pathway description

The initial adaptation action for the Main Beach of Arkai / Moa (Kubin) avoiding and maintaining the present-day landscape through dune management. As time progresses, the community should lead ongoing custodianship and

Arkai – Main Beach				
		Present Day	2050	2100
— Prepare	Ongoing monitoring and review			
→ Implement	Trigger for an additional action	Avoid (and maintain)	Avoid (and maintain)	Monitor (look and learn)
⋮ Transition	Start implementing			
	Pause and review adaption actions			
	Abandon existing action and seek alternative pathway			
Key management area adaptation actions and pathway				
Nature based coastal management	Dune management			
Transition	Relocate assets			
	Redesign for resilience			

JETTY AREA

Overview of assets and values at risk

- The jetty area is in the centre of what was once a small bay on the western side of the headland.
- The bay has been split in two by the jetty creating two small beaches either side. No significant erosion had occurred at these locations during previous studies, however there are concerns of inundation to the north towards the aerodrome.
- At the jetty area, the erosion is limited however there are concerns about inundation.
- The community reports the barge landing is unusable at times due to the strong currents.



Pathway description

The initial adaptation pathway for the Jetty Area on Arkai / Moa (Kubin) involves avoiding and maintaining the present-day landscape through dune and vegetation management. While the risk profile is not expected to increase significantly, trigger points may be reached initiating a transition to actively managing coastal hazards by importing sand to nourish the beach, repairing existing revetments and sea walls or constructing a new seawall. As time progresses, the community should lead ongoing custodianship and monitoring and, in the meantime, avoid new development in hazard-prone areas.

			Arkai – Jetty Area		
			Present Day	2050	2100
— Prepare	Ongoing monitoring and review	Pause and review adaption actions			
→ Implement	Trigger for an additional action	Abandon existing action and seek alternative pathway	Avoid (and maintain)	Avoid (and maintain)	Monitor (look and learn)
⋮ Transition	Start implementing				
Key management area adaptation actions and pathway					
Nature based coastal management		Dune management			
		Import sand to nourish the beach			
Coastal engineering		New seawall or revetment			
		Seawall or revetment upgrade and filling gaps			
Transition		Relocate assets			
		Redesign for resilience			



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TOWNSHIP

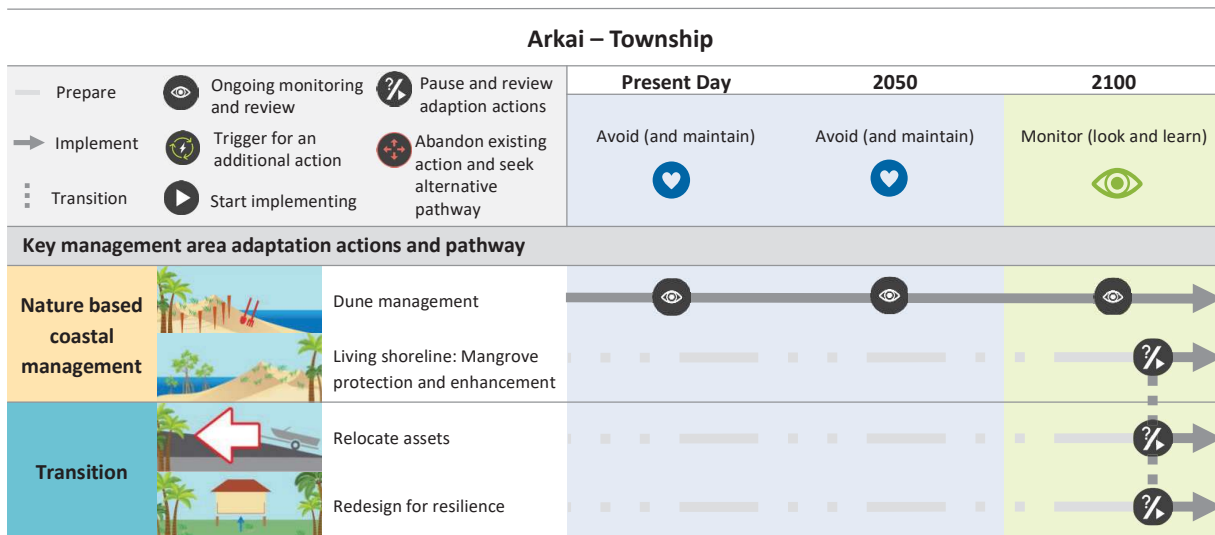
Overview of assets and values at risk

- There are a few houses, the motel and the airport building in vulnerable locations. They are however, in a generally low risk category.
- Future inundation could impact sewer infrastructure.
- Other important infrastructure is well set back from the shoreline.



Pathway description

In the Township of Arkai / Moa (Kubin), the pathway begins maintaining the present-day landscape through dune management. As trigger points are reached, the community can progress to actively manage the area with mangrove protection and enhancement. As time progresses, the community should lead ongoing custodianship and monitoring and, in the meantime, avoid new development in hazard-prone areas.



Arkai 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		
Arkai1.1a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
1.2. Education and knowledge sharing		
Arkai1.2a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
1.3. Monitoring		
Arkai1.3a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
2. Planning updates (Priority actions to be implemented within 10 years, and ongoing)		
2.1. Land use planning		
Arkai2.1a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
Arkai2.1b	Consider establishment of a stone quarry to provide materials for coastal protection throughout the Torres Strait.	\$\$
2.2. Disaster planning		
Arkai2.2a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
3. Resilient built environment (Priority actions to be implemented within 10 years, and ongoing)		
3.1. Maintaining and improving infrastructure		
Arkai3.1a	See Council wide actions. Consider how these actions can be effectively used in Arkai.	
4. Nature based coastal management (see adaptation pathways for timing)		
4.1 Dune, mangrove and reef protection and enhancement		
Arkai1.1a	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		
Arkai4.2a	Explore potential for a living shoreline to establish mangroves in the Township KMA.	\$\$
4.3 Beach nourishment		
Arkai4.3a	Monitor beach profiles in the Jetty Area KMA and, if extensive erosion occurs, 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 Arkai4.1.a	\$\$
5. Coastal engineering (see adaptation pathways for timing)		
5.3 Last line of defence structures		
Arkai5.3a	As part of the adaptation pathway in the Jetty Area KMA, consider the construction of a coastal protection structure north of the Jetty to protect the access road. This action should not occur before Arkai4.3a is 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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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

