

6. Coastal hazard adaptation actions

Masig

Community overview

Community	English name	Cluster	Type
Masig	Yorke	Central	Coral Cay

Masig is part of the central island cluster and is home to approximately 283 people (ABS, 2021). The heavily vegetated island is a tear-drop shaped coral cay generally below +5 m AHD in elevation.

The island is located on a platform reef that varies in width from the northern to the southern side. On the southern side the reef flat is extensive, extending over 1,000 m from the shoreline at the widest point. The reef flat on the northern side of the island is much narrower, being slightly over 100 m in width at its narrowest point. This is a key consideration when investigating coastal processes along the respective shorelines.

The island's shape suggests alongshore current acting from west to east. This is supported by the accretion and erosion trend at the barge ramp (accretion of sediment on the western side), and by the long 'tail' of the island extending east.

Key infrastructure on Masig includes:

- Airport
- Regional council office
- State school (years p re-prep to year 7)
- Health centre with permanent doctor and two nurses
- Three grocery stores (IBIS and two Mini-marts)
- Reef pilots station
- Post Office agency
- Centrelink agency
- Motel Lowatta Lodge
- Councill workshop / compound
- SES shed
- Water plant reservoirs/ filtration collection wells
- Power station
- Sewerage treatment plant
- Barge ramp
- Pier (small craft and passengers only)



Risk

The Masig community is currently considered low to medium risk from coastal hazards. Sand management activities around the barge ramp could reduce the risk to residences. However the culturally significant cemetery in the south of the island is in the erosion hazard zone. Risk from storm tide and tidal sea level rise is expected to increase to high/very high risk within the medium to long term planning horizon of this strategy. Council's ongoing coastal protection works program has been occurring in parallel with development of this Strategy. New works, such as the soon to be constructed seawall/bund to the north and south, have the potential to reduce the risk once constructed.

Coastal hazards risk profile for Masig from present day to 2100

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

Adaptation response

A strategic adaptation response has been developed for Masig 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 Masig is to "monitor" through observing changes to individual asset's capacity to withstand hazards and reviewing risks. In 2050, the increasing inundation risks will trigger the adaptation pathway into active management, which will involve actively managing identified risks through a range of initiatives, including education, nature based and structural engineering solutions. By 2100, the coastal hazard risk profile for Masig will become to 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 socio-economic, cultural and environmental values of the Masig area.

Adaptation response profile for Masig

Present day	2050	2100
<p>Actively manage</p> 	<p>Actively manage</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 Masig 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 Masig 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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BARGE RAMP AREA

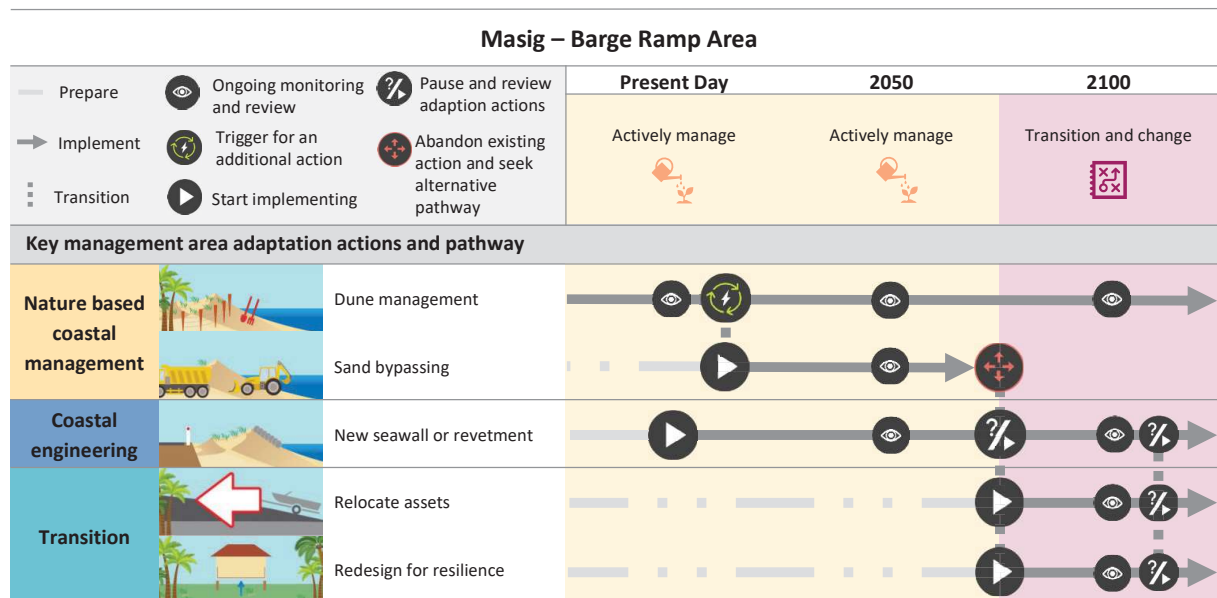
Overview of assets and values at risk

- The barge ramp has caused considerable erosion to the down drift (eastern) side of the groyne.
- The barge ramp has caused an accretion of sand on the western side, and corresponding erosion on the eastern side. This is as expected due to the longshore currents from west to east.
- Active sand nourishment has been undertaken historically by residents to help protect their homes from erosion, and could lessen impacts from coastal hazards in future if undertaken again.



Pathway description

In the Masig Island Barge Ramp Area, the adaptation pathway begins with nature-based dune management on either side of the barge ramp. By 2050, the risks to coastal hazards are expected to be high, triggering the township into an “Active management” pathway approach. Within the barge ramp management area this may involve constructing new seawalls or revetments at two sites, plans have already been prepared for structures on eastern side of the barge ramp. As time progresses, the community should lead ongoing custodianship and monitoring with the option to revisit the option of relocating or redesigning assets. In the meantime, the community should avoid new development in hazard-prone areas.



NORTHERN TOWNSHIP

Overview of assets and values at risk

- The township extends out to the northern beach where some residences are located adjacent to the top of the beach.
- The beach is low along the entire shoreline and the study found these homes may suffer from inundation during storm tides in the future.
- Some debris is evident along the beach. It is unknown if it has been placed by residents in an informal attempt to reduce erosion of the foreshore.

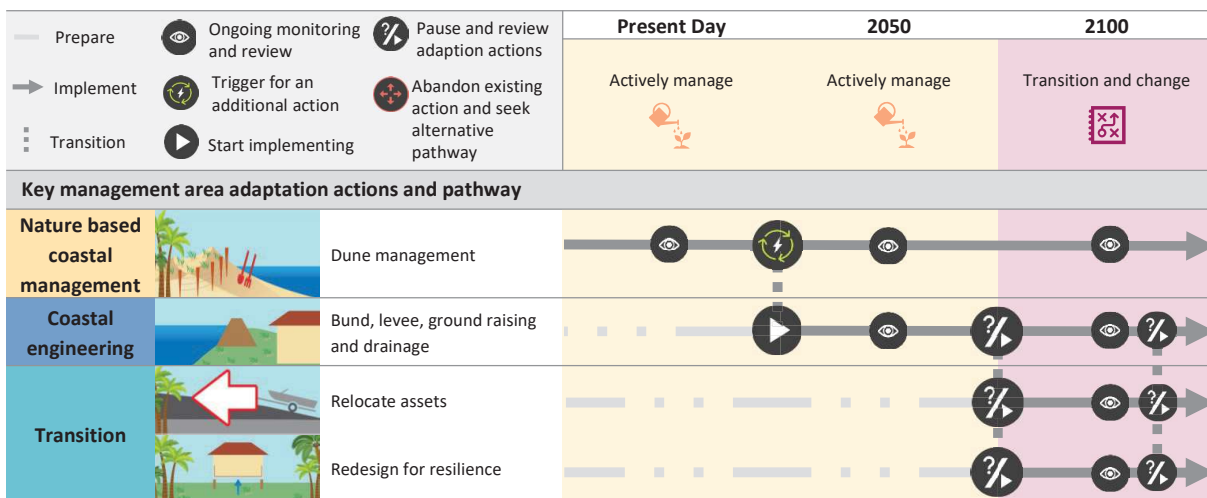


Pathway description

In Masig Island’s North Township, the adaptation pathway starts with nature-based dune management.

By 2050, the risks to coastal hazards are expected to be high, triggering the township into an “Active management” pathway approach. Within the North township management area this may involve installing bunds, levees, ground raising and drainage infrastructure, for which plans are already in place. As time progresses, the community should lead ongoing custodianship and monitoring with the option to revisit the option of relocating or redesigning assets. In the meantime, the community should avoid new development in hazard-prone areas.

Masig – North Township



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SOUTH TOWNSHIP

Overview of assets and values at risk

- The area has several buildings and structures located at the top of the beach.
- The shoreline is also low and flat on this side of the island, extending out onto the reef platform.
- The study indicates this area may be at risk from permanent inundation due to sea level rise and/or storm tide inundation but is not in an erosion prone area.
- The eastern end of the island, the 'tail', has been suffering from erosion on the southern side while the dunes build up on the north.
- The infrastructure of concern is the road travelling along the southern dune and the few residences located at the eastern end of the island.
- The south west corner of the island is uninhabited. The community have reported that there is erosion occurring at this location.



Pathway description

In the South Township of Masig Island, the adaptation pathway starts with nature-based dune management. By 2050, the risks to coastal hazards are expected to be high, triggering the township into an “Active” management pathway approach. Within the South township management area this may involve installing bunds, levees, ground raising and drainage infrastructure, for which plans are already in place. If further action is needed, new seawalls or revetments can be constructed in front of the airstrip. As time progresses, the community should lead ongoing custodianship and monitoring with the option to revisit the option of relocating or redesigning assets. In the meantime, the community should avoid new development in hazard-prone areas.

Masig – South Township				
		Present Day	2050	2100
— Prepare	👁️ Ongoing monitoring and review			
→ Implement	⚡ Trigger for an additional action	Actively manage	Actively manage	Transition and change
⋮ 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	👁️	👁️	👁️ →
Coastal engineering	New seawall or revetment	▶	👁️	⏸ →
	Bund, levee, ground raising and drainage	▶	👁️	⏸ →
Transition	Relocate assets	⋮	▶	👁️ →
	Redesign for resilience	⋮	▶	👁️ →

Masig 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		
Masig1.1a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
1.2. Education and knowledge sharing		
Masig1.2a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
1.3. Monitoring		
Masig1.3a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
2. Planning updates (Priority actions to be implemented within 10 years, and ongoing)		
2.1. Land use planning		
Masig2.1a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
Masig2.1b	Develop a "Priority Asset Relocation and Redesign Strategy" involving significant community consultation and input. This should identify potential new settlement zone on Masig 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		
Masig2.2a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
3. Resilient built environment (Priority actions to be implemented within 10 years, and ongoing)		
3.1. Maintaining and improving infrastructure		
Masig3.1a	See Council wide actions. Consider how these actions can be effectively used in Masig.	
Masig3.1b	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 the North and South Township KMAs.	\$\$
4. Nature based coastal management (see adaptation pathways for timing)		
4.1 Dune, mangrove and reef protection and enhancement		
Masig4.1a	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		
Masig4.2a	Explore feasibility of an artificial reef to enhance fringing reef resilience, bolstering natural sediment supply and dissipating wave energy.	\$\$
4.3 Beach nourishment		
Masig4.3a	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 Masig4.1a	\$\$
5. Coastal engineering (see adaptation pathways for timing)		
5.3 Last line of defence structures		
Masig5.3a	Maintain and upgrade the sea wall in the Barge Ramp Area.	\$\$
Masig5.3b	As part of the adaptation pathway in the South Township KMA, consider the construction of a coastal protection structure to protect key assets. This action should not occur before Masig3.1b, Masig4.1a and Masig4.3a are considered.	\$\$\$
5.4 Structures to minimise flooding		
Masig5.4a	Proceed with plans to construct bunds around the township.	\$\$
Masig5.4b	Consider the raising of access roads around the airstrip and barge ramp.	\$\$\$



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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

