Redland CITY COUNCIL

Adaptation Actions

Community Stewardship

Active community stewardship of the coastline provides a strong foundation for long-term success in coastal management. Fostering the shared care of the Redlands Coast coastline will maximise resilience and adaptive capacity.

Enhancing stewardship of the coastline

Community involvement in coastal management is important for enhancing the resilience of our beaches to coastal hazards. Across Redlands Coast, many community members and groups are active in the care of the coastline.

A priority action for coastal hazard adaptation is the ongoing coordination and support of stewardship initiatives that will seek to further empower and equip communities to:

- Contribute to on-ground dune protection and maintenance
- Promote and advocate for the care and protection of dune systems
- Share knowledge on observed changes to the coast
- Contribute to monitoring and evaluation of the implementation and success of adaptation actions.

Several community groups are active across the coastline. The full range of initiatives and activities that Council may undertake as part of the stewardship program include to:

- Utilise new communication platforms
- Seek new funding and grant opportunities
- Co-ordinate and facilitate community events
- Provide support to volunteer groups
- Identify complementary activities and synergies
- Seek partnerships and collaboration opportunities
- Deliver education and training programs
- Promote use and development of innovative tools and products
- Encourage participation and awareness.

Dune protection and maintenance

As a priority for sandy shorelines and to provide the best possible outcome for coastal hazard protection, community stewardship should have a strong focus on dune protection and maintenance. Community involvement may include:

- Fencing and creating designated walkways
- Controlling pests, weeds, and litter
- Revegetating native plants and trees, where possible
- Raising awareness and delivering educational workshops
- Protecting cultural sites
- Conducting surveys
- Contributing to the monitoring program through photo points and onground monitoring

Relevant and priority areas

The delivery of community stewardship program initiatives is a priority across all localities.

Community Stewardship		
	Programs and partnerships to enhance stewardship of the coastline	Dune protection maintenance and monitoring
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

SHEET 2

Adaptation Actions

Knowledge Sharing

A crucial element to increasing adaptive capacity is knowledge sharing. Knowledge sharing includes initiatives to promote education and awareness of coastal hazards, adaptation options, and how other agencies and individuals can be involved and act to reduce the risk of coastal hazards.

Coordination of knowledge sharing initiatives will further empower and equip stakeholders to:

- Understand coastal hazard risk and adaptation options
- Contribute to community stewardship initiatives
- Be informed, empowered, and equipped to manage risk to private assets
- Be informed of implementation progress of adaptation actions
- Contribute to the monitoring program.

Initiatives and activities that Council may undertake as part of coordinating a knowledge-sharing program include to:

- Promote collaborative action across stakeholder groups (host meetings, facilitate cross-agency communication)
- Establish coastal-specific collaborative partnership with Traditional Owners
- Generate communications materials to raise awareness of coastal hazard risk and the adaptation options being implemented
- Seek to manage perceptions on:
  - Levels of risk and tolerance
  - Shared responsibilities in the management of coastal hazard risks.
- Communicate the need for adaptive management
- Deliver and facilitate training programs and workshops, and link in with community stewardship education initiatives
- Coordinate information sharing across agencies (data, maps, monitoring data).



Relevant and priority areas

The delivery of knowledge sharing initiatives is a priority action across all localities

Knowledge Sharing		
	Facilitating knowledge sharing and education on hazards and adaptation	Other
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

Redland CITY COUNCIL

Adaptation Actions

Monitoring

Targeted monitoring provides a means to assess how the coastal environment is changing over time, and the effectiveness of adaptation options in mitigating the risk of coastal hazards.

The development and implementation of a targeted monitoring program to inform adaptive management is a critical component of all adaptation strategies.

A useful approach to monitoring coastal environments may include:

- Simple and frequent photo point monitoring and onground observations suitable for community participation
- Event-based monitoring (beach profile elevations)
- More detailed surveys (on-ground or aerial) every 5-10 years.

Monitoring observations may include:

- Dune movement
- Erosion extent
- Sand characteristics
- Sand coverage/ beach shape
- Exposure of structures
- Vegetation coverage, species, density and health
- Mangrove watch
- Seagrass watch
- High water mark
- Flood extent
- Exposure of rock

Council has undertaken a range of beach monitoring activities to inform management. Additional initiatives and activities that Council may undertake as part of a broader monitoring program include:

- Extending the existing photo point monitoring system
- Confirming a program of monitoring actions
- Creating a platform and process for data management
- Tailoring the monitoring program to align with/inform a 5-10 year review of adaptation response and options.

Photo point monitoring

Photo posts with a defined outlook or viewpoint can be installed to enable images to be captured from the same perspective each time. Photopoint monitoring use an email address or online app to help collect and collate photos, creating a photo record over time. This approach provides a simple way for community members and visitors to contribute to the monitoring of the beach. Formal or informal versions of this system can be established for any section of the coast.



CoastSnap
community beach monitoring

Periodic aerial imagery or drone surveys can be added to provide an aerial perspective of shoreline changes over time. Drone surveys can also provide elevation data that can be analysed to quantify changes in the beach profile over time ie. dune width, slope, toe position and, berm height. Elevation surveys can also be undertaken with on-ground equipment, includes survey stations and Global Positioning Systems.

Relevant and priority areas

Targeted monitoring is a priority action across all localities.

Monitoring		
	Monitoring changes in coastal hazard risk and effectiveness of adaptation	Photo point monitoring
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

SHEET 4

Adaptation Actions

Land Use Planning

Planning instruments can assist to mitigate the risk (likelihood and consequence) of coastal hazards, including erosion and storm tide inundation.

Statutory planning/planning scheme

Erosion Prone Area and storm tide inundation mapping is already incorporated in the Redland City Plan. The maps together with the Council's adaptation initiatives, will enable Council to:

- Ensure coastal hazards and risks are identified and considered
- Enable Council to manage and control/condition development and statutory approvals
- Incorporate flexibility and adaptability (i.e. triggers)
- Maintain values that are integral to the community
- Promote/encourage appropriate design and mitigation as part of new developments (resilience opportunities)
- Protect areas of environmental significance
- Plan ahead for required mitigation/transition actions

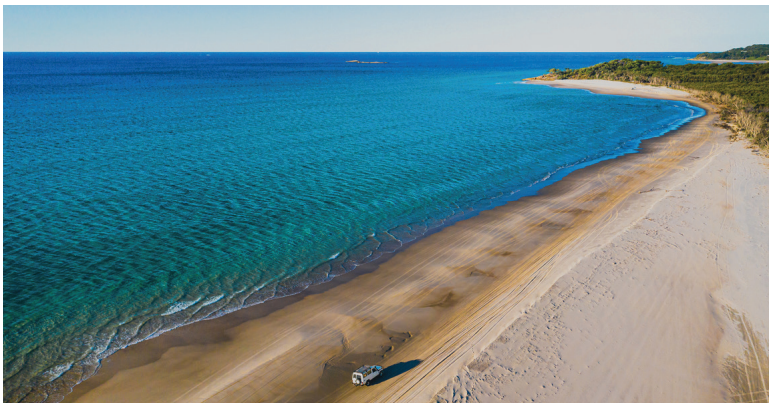
Other strategic planning

Adaptation response and actions also inform other planning related to infrastructure, open space, foreshore master plans and asset management.

Integrating a current understanding of coastal hazards and appropriate mitigation options into existing and new relevant strategies will assist in mitigating risk, enhancing resilience, and achieving multiple benefits from adaptation e.g. aesthetic and recreation benefits combined with risk mitigation.

Disaster management

A review and update of emergency response planning based on outcomes of adaptation planning will allow Council to plan accordingly to minimise the consequence of coastal hazard impacts during extreme events.



Up-to-date understanding of coastal hazard-prone areas, likely event magnitudes and extents, and possible access and infrastructure constraints will improve planning and preparation, as well as response and recovery efforts.

Priority areas

Planning updates are relevant across all localities.

Land Use Planning		
	Statutory planning/ planning scheme updates	Update emergency response planning
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

SHEET 5

Adaptation Actions

Increase Infrastructure Resilience

Modifying infrastructure is a practical way to mitigate the risk (likelihood and consequence) of coastal hazards, including erosion and storm tide inundation.

Upgrading infrastructure

Upgrades can be made to critical infrastructure that cannot be readily relocated out of a coastal hazard zone. Typical upgrades include raising floor levels to reduce inundation risk and changing infrastructure design and materials to be more flood-tolerant and minimise the consequence of inundation.

For efficiency, upgrades would typically coincide with upgrades and renewals scheduled in an asset management and maintenance program. Current coastal hazard zones, identified risks to infrastructure assets, and recommendations from adaptation planning will inform updates to asset management plans.

Relocating infrastructure

Where it is feasible to do so, critical infrastructure can be relocated out of the high-risk coastal hazard zone. This option requires long-term planning in asset management, as the location of critical infrastructure is influenced by demand and the need to support settlements and services.



Improving drainage networks

Improving drainage networks in the areas immediately surrounding infrastructure and in settlement areas can reduce the duration and consequence of storm tide inundation. This should be considered as part of the adaptation strategy and asset management plan for a locality.

Building resilient homes

In coastal areas, private dwellings may be exposed to the impacts of coastal hazards, including flooding as a result of storm tide inundation. Adopting flood-resistant ideas when designing a home can reduce the effects of flooding and is applicable when rebuilding, renovating, or constructing a new dwelling. Some of these changes may have higher initial upfront costs but provide a long-term benefit. Making these changes over time can reduce damage and disruption from future flooding.

Relevant and priority areas

Modifying infrastructure is a high priority for areas at high risk of tidal and storm tide inundation.

Increase Infrastructure Resilience			
	Upgrading infrastructure	Improve drainage networks	Resilient homes
Zone 1 North Mainland			
Zone 2 Central Mainland			
Zone 3 South Mainland			
Zone 4 Bay Islands			
Zone 5 North Stradbroke			

Relevant/feasible

Priority

Not applicable

SHEET 6

Adaptation Actions

Dune Protection and Maintenance

The dune system is the primary natural defence from coastal hazards. Foredunes dissipate wave energy and protect the land behind from impacts of erosion and storm tide inundation.

Dune protection and maintenance encourages sand to accumulate across the dunes and retain stabilisation. In most cases, a well-vegetated, stable dune system can be maintained through actively reducing disturbance and facilitating native vegetation establishment.

Native vegetation has an important role in dune development and stabilisation. Native vegetation actively captures windblown sand, which accelerates the build-up of dune volume and height, providing increased protection from coastal hazards to the land behind.

In Redlands Coast, North Stradbroke Island (Minjerribah) has expansive coastal dune systems that provide protection from erosion and inundation to many assets. Active protection and enhancement of these dune systems is an on-going priority action across the region.

Reduce disturbance

Reducing disturbance to the dune system can be achieved through fencing, signage, and providing formalised access points, walkways, or boardwalks at the most appropriate locations. Minimising access across the dune system is critical to allowing native vegetation to establish and contribute to the development of dune systems.

Weed removal and native vegetation regeneration

Native vegetation is significant to the role of enhancing dune development and stability in different localities. Exotic weed species are a threat to natural ecosystems and native vegetation. In most cases, controlled weed removal, combined with reduced dune disturbance, is sufficient to allow the regeneration of native vegetation in affected locations.



Revegetation

In some cases, if native vegetation has been diminished due to clearing or other disturbances, the revegetation of native species may be required as part of the dune protection and maintenance plan. Revegetation plans can be tailored to consider suitable species, access, views, and other site-specific requirements. Bio-degradable materials, like matting, can also assist in the establishment of vegetation.

Relevant and priority areas

Dune protection and maintenance is a priority action for all localities with open coast sandy shorelines.

Dune Protection and Maintenance			
	Reduce disturbance (fencing)	Weed removal and encourage native regeneration	Native revegetation if required
Zone 1 North Mainland			
Zone 2 Central Mainland			
Zone 3 South Mainland			
Zone 4 Bay Islands			
Zone 5 North Stradbroke			

Relevant/feasible

Priority

Not applicable

SHEET 7

Adaptation Actions



Beach Nourishment

Beach nourishment involves providing additional sand to increase the volume of sand on the upper beach.

Sand can be sourced from the intertidal zone, quarries, or offshore. Beach nourishment is typically combined with dune maintenance and protection plans to enhance resilience to coastal hazards.

Beach nourishment has the benefit of providing increased protection from coastal hazards while maintaining the natural values and aesthetics of the beach and coastline. Beach nourishment is typically achieved through sand scraping or importing sand.

Sand scraping

Sand scraping involves mechanically moving sand from the intertidal zone to the dune or upper beach zone, mimicking the natural beach recovery processes (at an accelerated rate). The overall sediment budget of the beach remains the same.

Importing sand

Importing sand to nourish the beach involves sourcing and distributing sand to increase sand volume and build up the dune system. Sand can be placed through a variety of methods, including pumping via a pipeline, sand rainbowing from off-shore, or direct profile nourishment and dune nourishment using excavators.

Beach nourishment volumes can be designed to mitigate coastal hazards at specific sites for several years.
A routine beach nourishment program can often be a more cost-effective adaptation option with added recreational and aesthetic benefits for mitigating coastal hazards than the last line of defence structures, such as seawalls.

Relevant and priority areas

A detailed beach nourishment assessment is required wherever beach nourishment is recommended to evaluate site-specific issues, including:

- Potential sources of sediment and longevity of sediment supply
- Characteristics of desired sediment e.g. colour, grain size, material
- Volume of material required over the short and long-term.

Beach nourishment is relevant to several localities along the Redlands Coast coastline and a priority action in foreshore areas at high risk of coastal erosion.

Beach Nourishment		
	Sand scraping	Import sand to nourish the beach
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

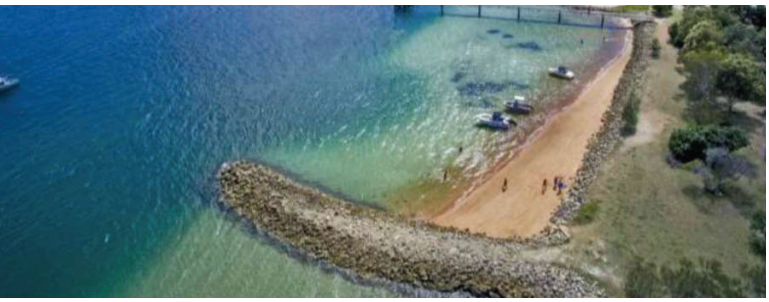
Relevant/feasible

Priority

Not applicable

SHEET 8

Adaptation Actions



Structures to Assist with Sand Retention

Structures can be installed to assist with retaining sand in a specific area of the shoreline. Groynes are the most common structure used for this purpose, extending perpendicular to the beach. Groynes are typically combined with beach nourishment plans to provide the most enduring benefit to the beach.

Groynes intercept the longshore movement of sand and assist in retaining sand on the beach between the structures. Sand will accumulate to the side of the groyne and in the direction sediment is moving. Some localised erosion can occur on the lee-side. Permeable groynes allow water to flow through at reduced velocities, while impermeable groynes block or deflect the current.

Groynes can be constructed from a range of materials, including rock, geotextile sandbags (geo-bags), wood, and other materials, such as sheet piles, gabions, and concrete. The design of rock or geo-bag groynes are commonly used in Australian marine environments due to the durability and availability of materials, suitability for design standards, and aesthetics.

Rock groynes

Groynes constructed of rock become relatively permanent features of the landscape. Rock groynes are typically used to assist with retaining large volumes of sand in a localised area on an ongoing basis.

Geo-bag groynes

Geo-bag groynes are becoming increasingly used for coastal management. These groynes are constructed of large geo-textile bags filled with sand.

These groynes will be periodically covered and exposed. Geo-bags have a shorter design life than rock groynes. However, they are more suited to adaptive management and can be replaced if the management approach changes.

Groynes are part of Council's coastal management measures at several beaches in Redlands Coast. For example, on the bay side of Raby Bay or at Amity Point.



Relevant and priority areas

Groynes are a relevant action across all sandy beach localities with a dominant long-shore drift direction. The feasibility of groynes is assessed on a site-by-site basis. The site's feasibility of groynes may change over time to reflect the changing coastal hazard risk and adaptation objectives.

Structures to Assist with Sand Retention		
	Rock groynes	Geo-bag groynes
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

SHEET 9

Adaptation Actions



Structures to Dissipate Wave Energy

Structures can be installed off-shore to create a zone where wave energy will break and dissipate before to reaching the beach. These structures are referred to as breakwaters and artificial reefs.

Breakwaters are erosion control structures most frequently placed parallel to the coastline. Breakwaters are typically constructed using rock or geotextile sandbags (geo-bags). Exposed breakwaters have a crest that rises above the surface of the water, whereas submerged breakwaters do not.

Artificial reefs can similarly be used to reduce wave energy and erosion of shorelines and are typically composed of base materials such as rock or geo-bags. They are submerged structures that function through wave dissipation and wave rotation, leading to salient growth in the lee of a reef. To a greater extent than breakwaters, artificial reefs can also be used to enhance marine biodiversity and recreational amenity.

Mangroves

Mangroves have a criticial role in providing natural dissipation of wave energy, and its ability to provide coastal hazard protection is becoming increasingly recognised.

The protection and restoration of mangrove communities along shorelines is an effective coastal hazard adaptation initiative. Established mangrove communities exist around Redlands Coast. For example, at Wellington Point and Geoff Skinner Reserve. This natural ecosystem should be protected to provide shorelines with protection from wave energy. This coastal management option is typically an extension of dune protection and maintenance activities.

Relevant and priority areas

The protection and enhancement of mangroves is a priority across localities where they are established. Breakwaters and artificial reefs require careful design and construction to ensure they work effectively and are often cost-prohibitive for many locations.

These options may be feasible for some sites across Redlands Coast, however, require further design and investigation to assess their suitability.

Structures to Dissipate Wave Energy			
	Breakwaters	Artificial reef	Mangrove protection and enhancement
Zone 1 North Mainland			
Zone 2 Central Mainland			
Zone 3 South Mainland			
Zone 4 Bay Islands			
Zone 5 North Stradbroke			

Relevant/feasible

Priority

Not applicable

Redland CITY COUNCIL

Adaptation Actions

Last Line of Defence Structures

The last line of defence structures can be used to protect critical assets from coastal hazards. These structures are typically in the form of a seawall that provides a barrier between the ocean and adjacent coastal land.

Seawalls are built as either vertical or sloped structures and are typically made of rock, concrete or geotextile sandbags (geo-bags). These structures can also be designed as buried revetment walls or exposed walls.

Seawalls are designed to withstand extreme weather events and must meet the required design standards to provide sufficient protection from coastal hazards and wave actions.

Exposed seawall

An exposed seawall is a barrier against wave energy. Unlike a dune system, a seawall has limited capacity to dissipate wave actions.

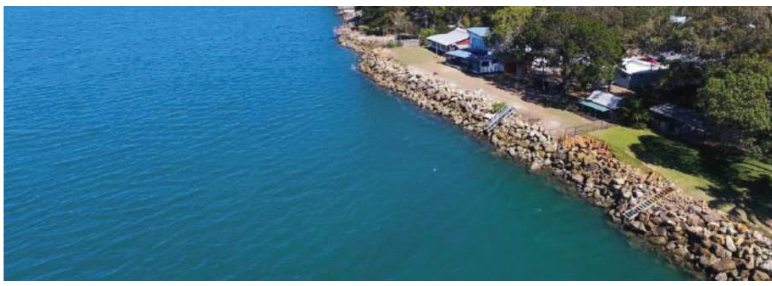
Consequently, waves retract off the seawall and can scour sand from the base of the wall, resulting in a change in or progressive loss of the sandy beach.

Exposed seawalls are typically used only as a last line of defence to protect critical infrastructure and assets and in urbanised foreshore environments.

Buried seawall

In some instances, seawalls can be constructed as buried revetments. A buried seawall means the wall is buried under the sand, the dune system is revegetated, and an effort is made to ensure the sand is retained to keep the wall buried.

A buried seawall protects the foreshore from weather events while maintaining natural beach aesthetics.



However, it may involve additional costs of periodic beach nourishment to ensure the wall remains buried.

Relevant and priority areas

Existing seawalls established in several areas across Redlands Coast are at high risk of coastal erosion.

New or upgraded seawalls are feasible for several foreshore areas and used as a last line of defence structure based on implementation triggers consistent with the Queensland Government planning policy.

Last Line of Defence Structures		
	Exposed seawall	Buried seawall
Zone 1 North Mainland		
Zone 2 Central Mainland		
Zone 3 South Mainland		
Zone 4 Bay Islands		
Zone 5 North Stradbroke		

Relevant/feasible

Priority

Not applicable

Redland CITY COUNCIL

Adaptation Actions

Structures to Minimise Inundation

Structures such as dykes, levees, and storm surge barriers can be used to protect low-lying coastal land from inundation.

Dykes and levees take the form of elevated mounds or walls that can be constructed from soil, rock, concrete, geotextile sandbags, or other materials.

The terms ‘dyke’ and ‘levee’ are often used interchangeably to refer to a structure that prevents water from flooding a specific area.

However, dykes are commonly referred to as structures that prevent low-lying land from being permanently inundated, and levees are referred to as structures that help prevent the land from being occasionally inundated as a result of flood events.

Storm surge barriers (tidal barrages or gates) are physical barriers that prevent storm surges from flowing inland through rivers, lagoons, inlets, or other waterways.

Storm surge barriers can generally be opened and closed and are effectively implemented at narrow tidal passages. They can vary in size from a flow valve on pipes and culverts to large scale barrages.





Relevant and priority areas

The design and effectiveness of storm surge barriers to a specific area require major investigation that assesses the site’s feasibility.

Structures such as levees and dykes used to minimise the inundation of low-lying land are relevant to inundation-prone areas across all localities.
Levee networks are present in some low-lying areas.

Structures to Minimise Inundation			
	Dykes	Levees	Storm surge barriers
Zone 1 North Mainland			
Zone 2 Central Mainland			
Zone 3 South Mainland			
Zone 4 Bay Islands			
Zone 5 North Stradbroke			

Relevant/feasible

Priority

Not applicable