

Coastal resilience and adaptation

What does resilience mean?

The ability to be resilient is now seen as one of the key attributes of a sustainable city – economically, environmentally, socially and institutionally.

Resilience is the capacity of social, economic and environmental systems to cope with or ‘bounce back’ following a hazardous event or disturbance. It also means responding or reorganising in ways that maintain essential function, identity and structure, while also maintaining the capacity to adapt and transform.

How can we adapt to coastal hazards?

There are a range of ways we can adapt to coastal hazards. Across each locality, strategic adaptation responses include to:

- Monitor coastal hazard risk (status quo)
- Mitigate coastal hazard risk (defend, accommodate)
- Transition the land use (retreat from or avoid/lower the risk).

For each of these responses there are a range of adaptation actions that can be applied.

These include:

1. Changes and upgrades to infrastructure
2. Coastal engineering options
3. Updates to land use planning
4. Initiatives to enhance adaptive capacity.

Example adaptation options

1. Changes and upgrades to infrastructure

Changes to infrastructure may include:

- Relocating critical infrastructure (e.g. access roads, hospitals, schools)
- Upgrading critical infrastructure that cannot readily be relocated
- Increasing floor levels (freeboard) of buildings in flood prone areas
- Updating drainage networks and systems.



2. Coastal engineering

Structures to minimise coastal flooding

A range of structures can be used to keep floodwaters from entering specific areas.

Dykes and levees are artificially elevated mounds or walls that can be made of earth, rock, concrete, geofabric bags or other materials. The presence of dykes and levees can be either part of an emergency planning approach, or more permanent features as part of a drainage network.

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

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

Tidal gates provide an opening through which water may flow freely when the tide moves in one direction, but which closes automatically and prevents the water from flowing in the other direction.

Backflow protection involves the use of valves, flap gates or similar to stop backflow through drainage pipes that can occur at high tide.

Structures to assist with off shore energy dissipation

Structures can be installed off shore to create a zone where wave energy will break and dissipate prior to reaching the shore.

Breakwaters and artificial reefs are typically composed of materials such as rock, concrete or geotextile materials.

Living shorelines are a more recent concept of off shore energy dissipation using a suite of erosion control techniques that combine natural coastal habitats with a natural or engineered means of breaking up a wave energy (e.g. mangrove island, oyster farm reefs/ breakwater).

Approaches for sandy shorelines

Dune protection and maintenance involves limiting disturbance to dunes and protecting/enhancing dune vegetation to increase the stability of the dunes.

Where present, the dune system is the beach's natural defence to coastal hazards. The foredunes dissipate wave energy and protect the land behind from impacts of erosion and storm tide. Vegetation across the dunes traps windblown sand and enhances the ability of dunes to rebuild after storm activity.

Beach nourishment involves importing additional sand to increase the volume of sand on the beach. Sand can be sourced from off shore, quarries or other sources. Beach nourishment is typically combined with dune maintenance, to enhance the level of protection against erosion and storm tide levels.

Beach nourishment has the benefit of providing increased protection from coastal hazards while maintaining the natural values of the beach and coastline.

Groynes are structures (rock, geotextile, wood) that extend perpendicular from the shoreline, and can assist with retaining sand in a specific area. Sand will accumulate to one side of the groyne. Groynes are often combined with a nourishment program.

Last line of defence structures

Seawalls provide a physical barrier between the ocean and adjacent coastal land, and protect the coastal assets behind the wall from erosion. Seawalls are typically made of rock, concrete or geo-fabric bags, and can be designed as buried revetments or exposed walls.

A seawall is a hard barrier to wave energy. As a result, waves refract off the seawall and scour sand away from the base (or toe). The presence of a seawall can often result in a complete loss of the high tide sandy beach. The appropriateness of seawalls is considered on a site by site basis.





3. Updates to land use planning

Updates to land use planning may include:

- Identifying appropriate areas for new development (residential, commercial), and new critical infrastructure (e.g. roads, hospitals)
- Tailoring specific uses for flood and erosion prone areas (e.g. sporting fields, open space and parklands, conservation zones)
- Planning for urban, industry, and ecosystem changes
- Updating emergency response planning, including early warnings for impacted properties.

4. Initiatives to enhance adaptive capacity

Initiatives to build adaptive capacity across our communities include:

- Developing programs and partnerships to support and enhance stewardship of the coastline
- Facilitating knowledge sharing and education on hazards and adaptation
- Monitoring changes in coastal hazard risk and effectiveness of adaptation.

Adaptation approaches:

- Will vary from site to site within each region
- Are tailored to the needs of local communities
- Consider the relative impacts of coastal hazards
- Seek to safeguard the values (social, environmental and economic) and character of the landscape.

Working together

To build resilience and adapt to change, Redland City Council is working with residents and community organisations to:

- Understand the current impact of coastal hazards
- Evaluate and upgrade existing mitigation measures
- Explore new adaption initiatives.

 [your say coastal hazard adaptation strategy](#)



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