

Redlands Coast

Bay and Creeks Plan

2021–2031



Contents

1.0 FOREWORD	2
2.0 REDLANDS COAST CREEKS AND MORETON BAY	4
3.0 WHY WE NEED A PLAN	6
3.1 STRATEGIC FIT	7
3.1.1 Regional	7
3.1.2 Redland City Council	7
4.0 OVERVIEW OF THE BAY AND CREEKS	8
4.1 VALUES OF OUR BAY AND CREEKS	10
4.1.1 Environmental Values	11
4.1.2 Economic Values	12
4.1.3 Social Values	12
4.2 HISTORICAL AND CURRENT LAND USE IN REDLANDS COAST	12
5.0 CURRENT CONDITION	13
5.1.1 What we know	15
6.0 CHALLENGES	16
6.1 IMPACTS FROM POPULATION GROWTH AND LAND USE CHANGE	19
6.2 CLIMATE CHANGE	21
7.0 FOCUS ON RECENT ACTIVITY	22
8.0 VISION AND GOALS FOR THE BAY AND CREEKS	24
9.0 ACTION PLAN	26
10.0 REFERENCES	28
11.0 APPENDIX 1 – RELEVANT LEGISLATION	30
12.0 APPENDIX 2 – 2019-2020 BAY AND CREEK ACTIVITY HIGHLIGHTS	31
13.0 APPENDIX 3 – MANAGEMENT PLANS AND ASSOCIATED DOCUMENTS	32

List of figures

Figure 1: Environmental Plans.	7
Figure 2: Redlands Coast Catchments.	9
Figure 3: Bay and Creek Values.	10
Figure 4: Healthy Land and Water overall waterway condition scores over time from Annual Report Cards.	15
Figure 5: Challenges –climate change and population growth and land use	17
Figure 6: Simple conceptual model of areas of Moreton Bay including pressures.	20
Figure 7: Examples of key Redland City Council programs that contribute to protecting and enhancing the value of Redlands Coast waterways and Moreton Bay.	23
Figure 8: Goals.	25

1.0 Foreword

Redland City Council manages significant natural, built, cultural and social assets involving land and waterways that flow to Moreton Bay. Moreton Bay contributes \$7.56 billion to the South East Queensland economy each year, including directly benefiting the local economy of Redland City. Maintaining the ecological health of our local waterways and the bay is therefore coupled, and vital for building resilience to manage current and future challenges, including population growth and climate change.

Council has invested significantly in assessing and improving the condition of our waterways and the bay, with initiatives such as the waterways monitoring and assessment programs, implementing actions to reduce sediment loads from construction sites and through the commitment to plant one million native plants by 2026. The development and implementation of *Redlands Coast Bay and Creeks Plan* reflects an ongoing commitment to sustainable stewardship of our waterways and the bay.

The *Redlands Coast Bay and Creeks Plan* provides strategic intent for protecting, maintaining and enhancing the health of our waterways and the bay. The Plan guides and prioritises management actions and Council's operational activities for ensuring ongoing resilience of our waterways and the bay over the next ten years.

Redlands Coast Bay and Creeks Plan is a non-statutory document and supersedes the *Total Water Cycle Management Plan 2013*. The specific operational management actions are presented in the supplementary Action Plan, and have been developed to be practical, realistic, targeted and achievable.

The *Redlands Coast Bay and Creeks Plan* and supplementary Action Plan align with and operationalises Council's implementation of the *Lower Brisbane-Redlands Coast Bay and Creeks Plan* that Council endorsed in 2018.





2.0 Redlands Coast Creeks and Moreton Bay

Management of Moreton Bay and Redlands Coast's creeks extends to areas that Redland City Council (Council) has custodianship of, or has direct influence on. This includes public land and private land, which may be regulated via development approvals or other legislation. Council has the opportunity to influence individuals, businesses and other organisations using a range of legislative and non-legislative measures. Education and engagement activities can be used to support stakeholders alignment to the strategic direction presented in *Redlands Coast Bay and Creeks Plan* (the Plan).

For the purposes of this Plan, 'waterways' includes all waters and waterways in Redland City, including creeks, estuaries, wetlands, lakes, dams, artificial water bodies, stormwater infrastructure, foreshores, coasts and river and Moreton Bay. Moreton Bay area is identified according to the Moreton Bay Marine Park Zoning Plan.

Groundwater is within the scope of the Plan, particularly to the extent that it interacts with surface waters and Moreton Bay. Land that discharges to Moreton Bay is also recognised because rainfall runoff from this land flows to the bay and can therefore influence the health of the bay.

Management of our waterways and Moreton Bay will be achieved through collaboration and partnerships established between Council, traditional owners, community members, various levels of government and other stakeholders.



Credit K McNeale

3.0 Why We Need a Plan



The liveability of Redlands Coast and the sustainability of communities within its catchments are strongly influenced by the health of our waterways and Moreton Bay.

However, existing and emerging challenges from land use change, population growth and a changing climate, likely mean that the 'business-as-usual' approach to managing our bay and creeks may not protect the lifestyles we value, the economy that provides our prosperity or the healthy environment that contributes to our quality of life.

The management of the waterways and bay is complex. Therefore, there is need for a plan with a clear vision to identify priorities, set a clear future direction and drive coordinated and targeted actions. This Plan presents a vision for the creeks and bay to ensure Council's and community actions leave a positive legacy for the future Redlands Coast.

3.1 Strategic Fit

There are a number of international, Commonwealth and state legislation relevant to the management of waterways and Moreton Bay. Refer to Appendix 1.

3.1.1 Regional

Lower Brisbane-Redlands Coastal Catchment Action Plan (CAP)

In October 2018, Council endorsed the *Lower Brisbane-Redlands Coastal Catchment Action Plan*. The CAP was developed by the Council of Mayors' Resilient Rivers Initiative, which included consultation with officers from Brisbane and Redland City Councils.

The actions identified in the CAP contribute to achieving the goals of the *Resilient Rivers Regional Strategy (2015–2025)*. The goals of the Strategy are:

1. Keep soil on our land and out of our waterways.
2. Help protect our region's water security.
3. Improve the climate resilience of our region.
4. Promote partnerships with strong leadership to deliver a coordinated approach to catchment management in SEQ.

The associated Risk Treatment Plan sets out the high-priority actions recommended for the Lower Brisbane-Redlands Coastal Catchment. This focuses on actions that mitigate high risks and have a high likelihood of success.

3.1.2 Redland City Council

The Natural Environment Policy outlines Council's commitment to protect, enhance and restore the health and viability of Redland Coast's natural aquatic values and environments for their inherent value and the benefit, use and lifestyle of current and future generations.

Redland City Corporate Plan 2021-2026 establishes a commitment to promoting:

Our environment enhances our identity, lifestyle, wellbeing, economy and cultural values. Opportunities to be immersed in our naturally wonderful environment are harnessed, and drive our commitment to protect and enhance our natural assets.

This *Redlands Coast Bay and Creeks Plan* and the associated Action Plan supports this position by outlining a coordinated set of actions to protect and restore the resilience of the creeks and Moreton Bay. (Figure 1)

The Plan aligns and supports other Council strategies and plans that have direct influence on our waterways such as the *Coastal Adaption Strategy (CAS)*, *Coastal Hazard Adaption Strategy 2021 (CHAS)*, *Redland City Council Wildlife Connections Plan 2018*, *Redlands Coast Biosecurity Plan 2018* and *Redland City Council Conservation Land Management Strategy 2010*. Furthermore, this Plan seeks to align with other Council strategies and plans such as *Redland City Council Open Space Strategy 2026*, *Redlands Coast Rural Enterprises Industry Sector Plan 2019*, *Redland City Council Strategic Asset Management Plan 2019*, *Assets and Service Management Plans* and *Redland Water and Waste NetServ Plans*.

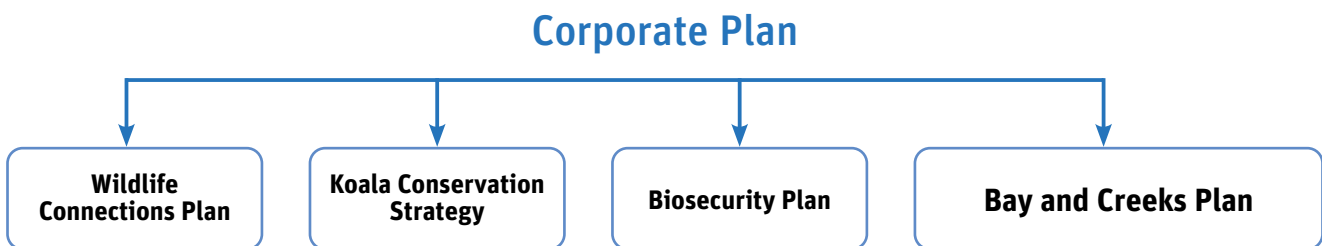
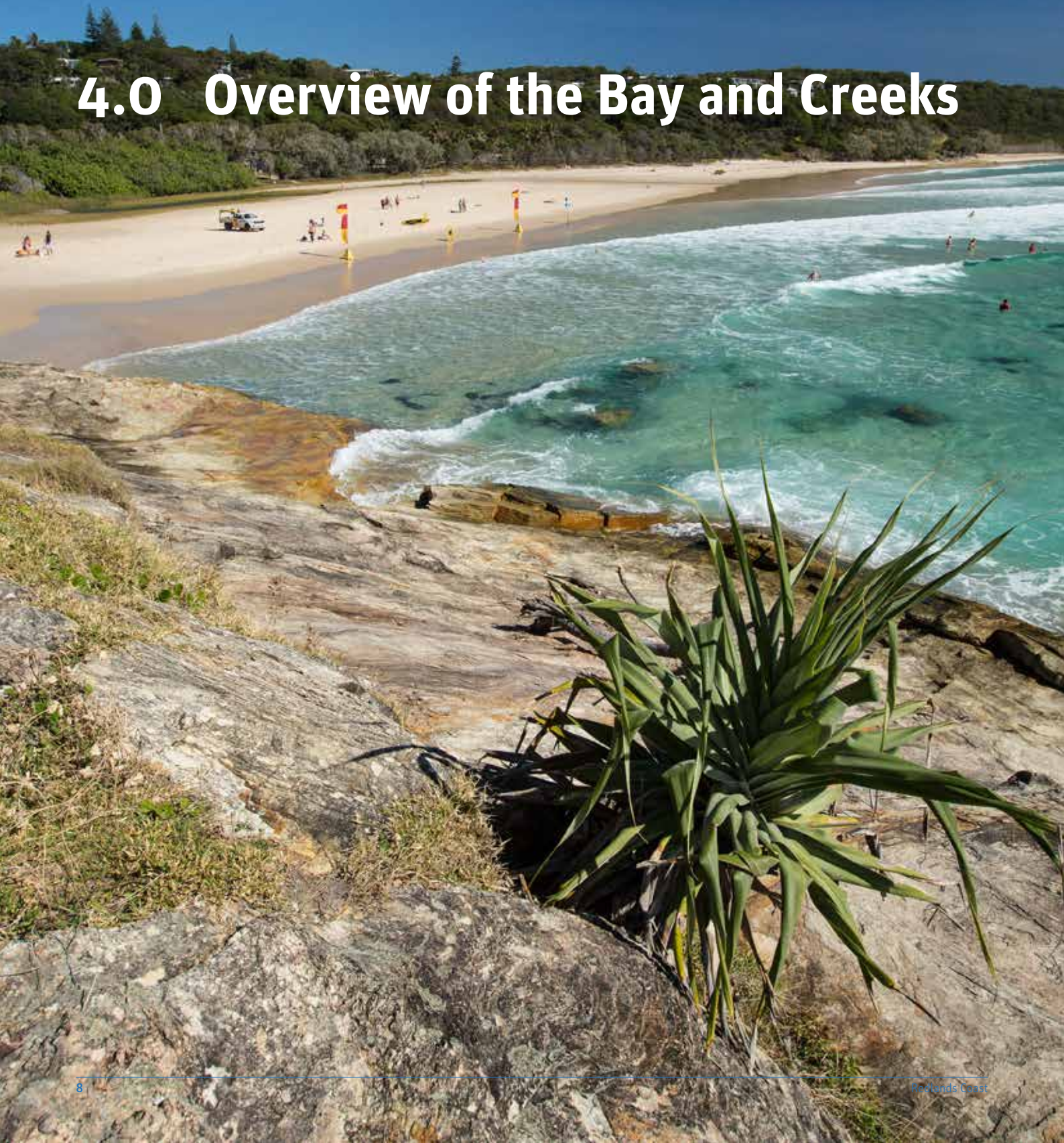


Figure 1. Environmental Plans

4.0 Overview of the Bay and Creeks



The Redland City Local Government Area (Redlands Coast) covers approximately 537 km² of land, 335 km of coastline and foreshore, and 525 km² of waterways across 22 catchments. Our waterways and their discharge volumes and catchment areas are relatively small in size compared to many waterways in the nearby Brisbane and Logan-Albert River Catchments (Figure 1).

Nineteen of the mainland catchments flow directly to Moreton Bay and the other three catchments (California Creek, Native Dog Creek and Serpentine Creek) flow indirectly to Moreton Bay via the lower reach of the Logan River. Redlands Coast waterways have a range of flowing and non-flowing habitats, and are fringed by diverse riparian ecosystems that provide habitat for terrestrial flora and fauna. The larger waterways on the mainland have their headwaters in the Mount Cotton hills (230 metres above sea level).

North Stradbroke Island (*Minjerribah*) has many freshwater lakes (dune, perched and window lakes) and significant

groundwater dependent ecosystems, including complex networks of sedge dominated wetlands. Waterways on Coochiemudlo Island and the Southern Moreton Bay Islands comprise of intermittent, undefined drainage lines that generally flow to wetlands, foreshore areas to the bay.

There are no large rivers within Redlands Coast, although the lower Logan River forms a small part of the City's southern boundary.

Moreton Bay is bounded on its eastern side by the large sand islands of Minjerribah and Moreton (*Mulgumpin*), and the mainland coast on the western side. Large rivers (Brisbane, Logan and Pine) discharge to the bay from a combined catchment of approximately 22,000 km². Moreton Bay is approximately 110 km long from north to south, of which Redlands Coast accounts for around 38 km. Moreton Bay is 35 km at its widest east to west.

Moreton Bay was declared a Marine Park in 1993 and is recognised internationally as a Ramsar Site.

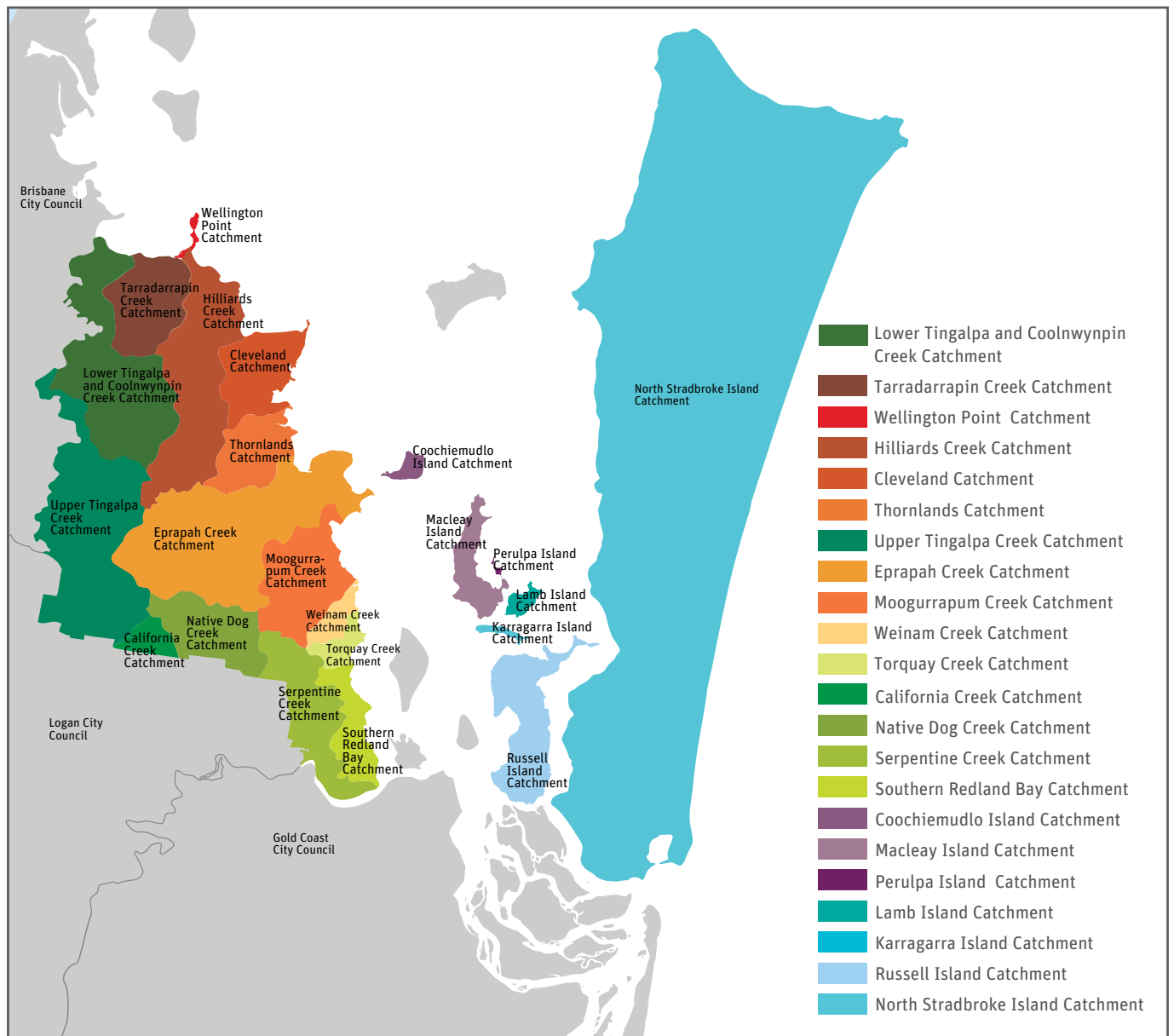


Figure 2: Redlands Coast Catchments

4.1 Values of our Bay and Creeks

Our waterways and the bay have important environmental, economic and social values, and these values underpin the lifestyle of residents of the Redlands Coast. These can include:



Environmental

- | | |
|-----------------------|--|
| Carbon sequestration | Water quality and quantity |
| Ecosystem services | Endangered threatened and vulnerable species |
| Biodiversity | Ecosystem richness |
| Intrinsic value | Healthy bay and creeks |
| Flora and fauna | Nutrient cycling |
| Ecosystems complexity | Carbon cycling |
| Natural resources | Buffering capacity |
| Healthy habitat | Connectivity |
| Corridors | |



Social

- | | |
|------------------------------|--|
| Relaxation | Opportunities for school-based education |
| Lifestyle | Cultural learning |
| Recreation | Traditions |
| Amenity | Places of meeting |
| Sport and fitness | Artefacts |
| Holiday destination | Indigenous history and cultural heritage |
| aesthetic value | Human health benefits |
| Support community resilience | |
| Environmental learning | |

Economic

- | | |
|--------------------|-----------------------|
| Commercial fishing | Eco-tourism |
| Water supply | Drainage / stormwater |
| Industry | Flood mitigation |
| Transportation | Green assets |
| Tourism | Drinking water supply |
| Recreation | Infrastructure |
| Business | Capacity for drought |
| Aquaculture | |



Figure 3: Examples of Bay and Creek Values

4.1.1 Environmental Values

Our waterways and the bay support significant biodiversity resources, and provide a range of ecosystem services.

Aquatic biodiversity resources are supported by a variety of aquatic habitats, including coral reefs, wetlands (including seagrass, mangroves, and saltmarsh), riparian habitats, instream habitat, beach wrack, mud flats, sandy beaches and rocky shores. Redlands Coast has wetlands of national and international significance. These include the wetlands of Moreton Bay, Carbrook Wetland Aggregation and Minjerribah. A special feature of Minjerribah are the perched wetlands, which are considered rare globally.

The wetlands, creeks and estuaries of Redland Coast provide habitat for many significant and threatened species, such as the wallum froglet, water mouse, loggerhead turtle and Oxleyan pygmy perch. Ornate rainbowfish is a locally significant species that is known to have different colour morphs in different creek systems of the Redlands Coast.

Moreton Bay provides habitat for more than 1,000 species of marine wildlife including fish, sea turtles, humpback whales, dolphins, waterbirds, and several threatened species, such as grey nurse sharks and dugongs. It contains one of the most extensive intertidal areas of seagrass, mangroves and saltmarsh communities along the eastern coast of Australia. Many of the significant wetland areas of Redlands Coast are recognised internationally within the Moreton

Bay Ramsar Site. The Moreton Bay Ramsar site regularly supports about 40,000 waterbirds and over 250 species of birds, including at least 34 migratory shorebird species listed under the China and Japan Migratory Bird Agreements. The Moreton Bay Ramsar site takes in large portions of the bay, Minjerribah, Southern Moreton Bay Islands and the mainland.

Many of the 82 threatened species and 77 migratory species that listed as matters of National Environmental Significance under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* that are found in the Redlands Coast rely on the health of our waterways and bay.

Ecosystem services provided by our waterways and the Bay include fisheries resources, nutrient cycling, carbon storage and shoreline protection. These ecosystem services directly benefit our community's livelihoods through food security, protecting water quality, including drinking water quality, protecting shorelines from coastal erosion and mitigating the impacts of climate change. Marine ecosystems are described as blue carbon ecosystems, as they provide a natural way of reducing the impact of greenhouse gases on our atmosphere, through carbon sequestration.

Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide.



Credit Jaleyna Ferrer

4.1.2 Economic Values

In addition to the indirect economic benefits our waterways and the bay provide via ecosystem services, our aquatic assets also provide a range of direct economic benefits.

Tourism is one of the key industry sectors of Redlands Coast and a key focus area for growth. Each year millions of visitors are attracted to the environmentally significant Moreton Bay, Minjerribah and Southern Moreton Bay Islands. Moreton Bay receives more domestic tourists each year than the Great Barrier Reef.

Moreton Bay is one of the most intensely used coastal systems in Australia and supports some of Queensland's most productive fisheries, providing a renewable resource for Indigenous, commercial, recreational and charter sectors. Moreton Bay contributes around \$7.56 billion to the South East Queensland economy each year.

4.1.3 Social Values

Redlands Coast residents value the recreation opportunities provided by their local waterways, with high numbers of people indicating that waterways are a place of rest and relaxation (70%) or places for social interaction with friends and family (64%). 'Engaging in recreational activities in, or alongside, a local waterway at least once a month' was reported by 60% of the residents surveyed. The 2020 Annual Healthy Land and Water Report Card indicated that 66% of Redlands Coast residents surveyed were satisfied with the recreational and aesthetic values of their local waterways.

4.2 Historical and Current Land Use in Redlands Coast

The Quandamooka People are the traditional custodians of much of Redlands Coast. Council also extends its acknowledgement of traditional custodians to the Danggan Balun (Five Rivers) People who are currently in the process of Native Title determination for areas that include parts of Redlands Coast. Council recognises and respects the

traditional custodians and their intrinsic connection to the lands and sea, along with their rich culture and heritage that dates back thousands of years. Indigenous people cultural activities include culturing oysters, mullet fishing and hunting dugong. These activities have occurred for centuries prior to European settlement and continue today.

Early Europeans developed horticulture, cropping and grazing on the productive red soils, and logged woodland areas. Commercial fisheries have operated in Moreton Bay since European settlement, and historical exploitation of some fisheries resulted in significant declines in the populations of whales, turtles and dugongs.

Over the past 70 years, there has been significant population growth in South East Queensland, including in the Redlands Coast. Substantial re-development of most of the catchments of Redlands Coast has resulted in rapid urbanisation converting former agricultural lands and bushland to residential areas. This is particularly evident in coastal areas, which are now heavily modified. Additionally, urban development has shortened and straightened some waterways (e.g. Ross Creek), and canal estates have been developed in the estuaries and inshore waters of some coastal catchments.

On the mainland, the south-western portion of the city is dominated by rural land uses, while the northern half and eastern coastal fringe are predominately urban. The range of rural land uses include horticulture, grazing and irrigated cropping, with most of the area's poultry farms located in the southern catchments. Quarrying and mining occurs in the headwaters of Tingalpa, Wallaby, Hilliards and Moogurrapum creeks.

Land uses of Coochiemudlo and the Southern Moreton Bay Islands (SMBI) - Macleay (*Jencoomercha*), Lamb (*Ngudooroo*), Karragarra (*Karragarra*) and Russell (*Canaipa*) Islands, mostly comprises urban development amongst bushland reserves. North Stradbroke Island (*Minjerribah*) has three townships, with the vast majority of island comprising areas of national parks and protected areas.

5.0 Current Condition

The condition of our waterways is monitored by Healthy Land and Water at a regional catchment level, and at a finer scale by Council over the last 10 years.

The annual waterways report cards for Redlands Coast have indicated that:

- ▶ The health of freshwater waterways has declined over time and is now generally poor, with the extent of freshwater wetlands in the Redlands Coast catchment also classified as poor. The monitoring data indicates that waterway health is subject to seasonal fluctuations (C to C+, depending on the time of year), and that loads of sediment and nutrients have increased over time, although these may be linked with periods of higher rainfall. Overall, freshwater fish communities have declined, macroinvertebrates have remained stable and ecological process have increased slightly, although slight improvements in water quality and fish community health were recorded at sites on Eprapah Creek. The extent of streambank vegetation along creeks of Redlands Coast is good, and wetlands are stable. Currently 86% of streambanks in Redland City are vegetated.
- ▶ The water quality of estuarine reaches is fair, and the extent of wetland habitat (mangroves and saltmarshes) in the estuaries is excellent. These excellent condition estuarine habitats in the Redlands Coast are critical for maintaining the productive recreational and commercial fisheries the Redland's community relies on.

- ▶ The health of Moreton Bay is good overall, water quality is excellent and the extent of wetland habitats is excellent. The western and central bay have had notable improvement in ecological condition since 2015 (Figure 4).

The results of Council's waterway monitoring program indicates that there is considerable variability in water quality results across the catchments over time (i.e. high spatiotemporal variability), however many of the creeks within Redlands Coast are consistently nutrient rich, with total phosphorus, total nitrogen and ammonia levels typically exceeding the Queensland Water Quality Guidelines. High levels of nutrients can result in excessive algal growth, which in turn can block sunlight to aquatic plants, reducing photosynthesis and respiration which then may cause decreased concentrations of dissolved oxygen in the waterway. Low dissolved oxygen may then negatively impact fish and other aquatic wildlife. The impact pathways of land use development on water quality and habitat conditions are complex.



Credit Neil McGregor

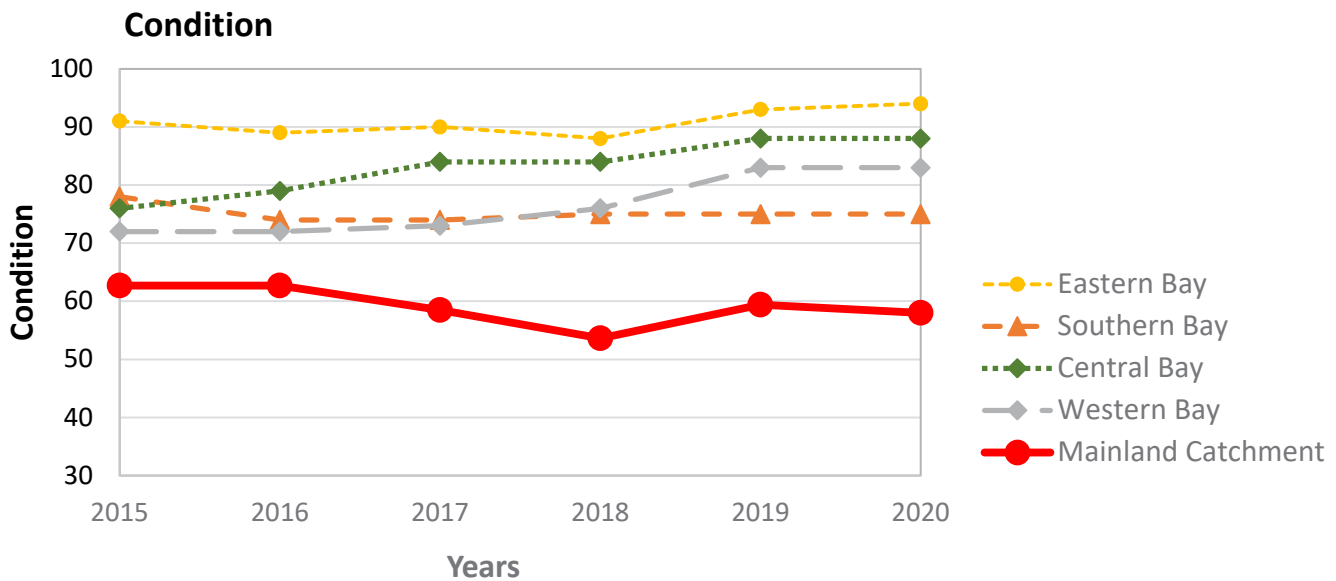


Figure 4. Healthy Land and Water overall waterway condition scores over time from Annual Report Cards.

5.1.1 What we know

Council understands that:

- ▶ Protecting existing riparian vegetation and wetlands from clearing and weed infestation is a key environmental management priority
- ▶ Best practice erosion and sediment control at construction sites is effective in controlling sediment transported to waterways, but there are opportunities for continuing to improve compliance with best practice across all construction sites
- ▶ Water sensitive urban design (WSUD) is effective in improving water quality and flow patterns in urban waterways, and increased adoption of WSUD in existing and new urban areas will benefit the health of waterways
- ▶ Aging stormwater assets are a challenge to manage and maintain, with some end of pipe structures contributing to scouring of waterways and causing creek bank instability
- ▶ Waterbodies in Council ownership are a challenge to manage with some requiring significant retrofitting, and many are without active management and maintenance schedules
- ▶ Filling gaps in riparian corridors is a cost effective solution for improving waterways health
- ▶ Our freshwater creeks have locally important populations of native fish species, however pest fish are an issue in most waterways
- ▶ Native fish species diversity and migration improve when barriers are removed, as evidenced by the success of the recent fishway installation on Hilliards Creek, however there are other known barriers across the city requiring fish passage solutions to improve the viability of our local freshwater fishes

- ▶ Council is responsible for multiple ecological, social and infrastructure assets that both influence and are influenced by the health of our bay and creeks, including:
 - ▶ Green assets such as waterways (creeks), waterbodies, wetlands, foreshore and low lying land along the coast
 - ▶ Council land, especially bushland reserves, adjacent to the bay and waterways that helps maintain water quality and aquatic habitat condition, and provide core habitat and habitat corridors for a wide range of terrestrial fauna species.
 - ▶ Council structures that are on, within or adjacent to waterways and the bay
 - ▶ Stormwater assets such as sediment basins, bioretention basins, end of pipe structures, gross pollutant traps, erosion sediment control pits and culverts
 - ▶ Wastewater treatment infrastructure and network

Objectives of WSUD

1. Protect natural systems
2. Integrate stormwater treatment into the landscape
3. Protect water quality
4. Reduce run-off and peak flows
5. Add value while minimising development costs

6.0 Challenges



Climate Change

Population Growth and Land Use

Weather

- reduced rainfall
- increased storm intensity
- overall changes to rainfall patterns
- extreme weather
- increased heat waves
- more droughts
- more days over 40°C
- higher maximum temperatures
- more wildfires
- higher peak windspeeds
- warmer sea

Chemical

- elevated CO₂
- water deoxygenation
- acidification of ocean
- increased harmful blooms, such as cyanobacteria blooms
- increased coral bleaching events
- change in rate of biochemical processes

Sea level rise

- more frequent sea-level extremes
- increased coastal hazard risk
- limited capacity for natural and made assets to respond to sea level rises

Hydrology

- altered flow regimes
- changes to connectivity within creeks
- increasing marine influence on creeks
- changes to creek flushing times
- changes to stratification within water column
- increased erosion
- sediment redistribution

Environment

- change in food web dynamics
- changes in sex ratios of some fauna
- changes to species assemblages within ecosystems
- change in habitat distribution

Pollution

- plastic litter
- emerging toxicants e.g. PFAS, microplastics
- wastewater contamination
- quality of urban runoff
- increase in nutrients

Environmental

- vegetation clearing
- Erosion and sediment control construction site
- modified hydrology and morphology
- fluvial episodic erosion
- aquatic pest (fish)
- terrestrial pests (pigs and foxes)
- eutrophication
- invasive weeds aquatic and terrestrial
- reduction waterway buffers
- reduced environmental flows
- sediment
- toxic cyanobacteria blooms
- loss of riparian vegetation
- fauna passage obstruction

Education

- lack of awareness and education of our community
- poor land management practices
- excess water and water energy (erosion)
- increased peak discharge
- domestic animals (cats and dogs)
- impacts of natural disaster
- unsewered properties

Economic

- fishing pressure
- stormwater treatment assets maintenance
- construction impacts from development
- urban lighting
- management of assets
- stormwater treatment assets not functioning to their intent
- extraction industry
- farm dams
- fragmentation of habitat
- constrained creeks
- poor water quality

Figure 5: Challenges – climate change and population growth and land use

The State of the Environment Report identifies climate change, changing land use, habitat fragmentation, habitat degradation, and invasive species as key pressures on Australia's environment. As a result, many Australian species and habitats are in decline, and it is thought that the rate of decline may accelerate if no intervention is made in the near future. Monitoring data indicates that freshwater fish in the Redlands Coast are declining, and some freshwater fish species in Redlands Coast have limited distributions at the local scale, with some found in only a few creek systems. Thus, these species are particularly susceptible to further impacts to waterway health at the local scale. Some of the main challenges to waterway health in the Redland Coast include waterway barriers, cleared and developed riparian zones, point source discharges, non-point source pollution and sediment from modified catchments, invasive species and altered flow regimes due to highly urbanised catchments. Increased nutrient and sediment loads have implications for the health of Moreton Bay, especially with respect to potential for algal and toxic cyanobacteria (blue-green algae) blooms.

Declining health of waterways and the bay also has implications for human health (e.g. quality of drinking water supplies, exposure to cyanobacteria blooms), lifestyle (e.g. recreation, liveability) and economic activities that rely on the health of our waterways and the bay (e.g. tourism, fisheries, aquaculture).

For the purpose of this Plan challenges have been placed into two broad categories:

- ▶ Impacts from population growth and land use change, and
- ▶ Climate change.



6.1 Impacts from Population Growth and Land Use Change

The Australian Bureau of Statistics estimated resident population for Redland City at the end of June 2020 was 160,331 persons. This is projected to increase to 192,431 by 2041 (Queensland Treasury 2018 – Medium series Projections). To accommodate the projected population growth an additional 17, 200 new dwellings are estimated to be required within the City between 2016 and 2041.

Construction in urban areas contributes significant volumes of sediment to the waterways. Less than 1% of land area across South East Queensland is under construction at any given time, however construction sites contribute 40% of the sediment load that enters Moreton Bay. The 'business as usual' approach could see sediment loads increase by 60% to 100% over the next 20 years. This translates to an estimated 50,000 dump trucks (or 500, 000 tonnes) of sediment entering South East Queensland waterways each year. The impacts of sediment directly, in addition to the numerous pollutants attached to sediment (e.g. nitrogen, phosphorus and heavy metals), mean that sediment is one of the most significant threats to waterway health in South East Queensland.

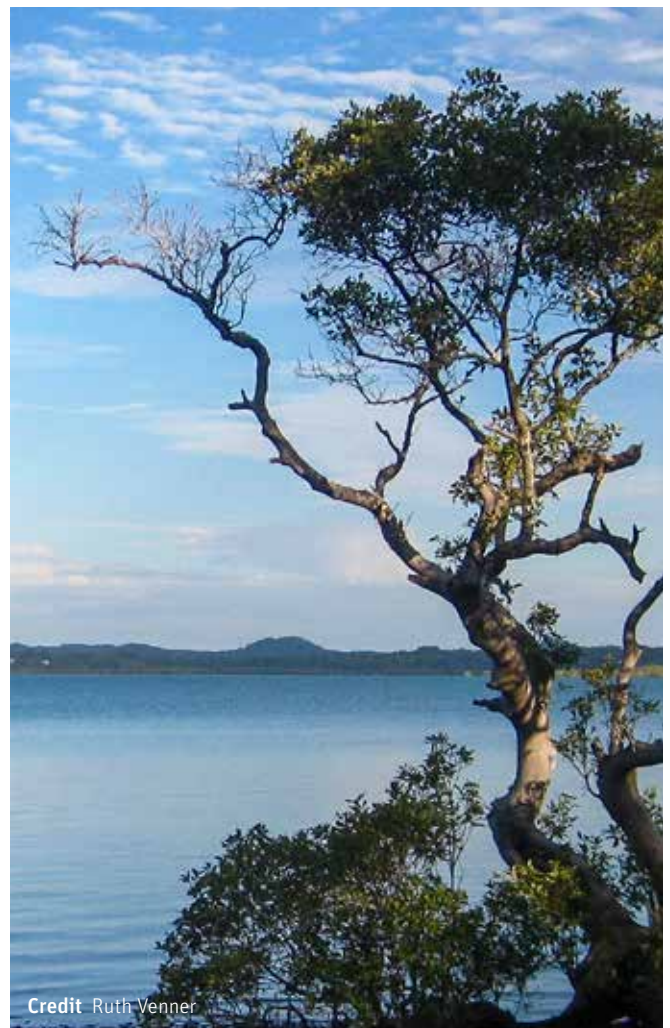
Various other pollutants associated with urban areas that significantly impact the waterways include, but are not limited to:

- ▶ nutrients, from sources such as wastewater and stormwater (wastewater treatment plants, septic tanks, fertilizer and animal wastes)
- ▶ synthetic chemicals (such as pesticides, herbicides, fungicides, pharmaceuticals, PFAS)
- ▶ heavy metals (lead, mercury, cadmium etc.)
- ▶ other persistent organic pollutants (petroleum hydrocarbons from road runoff and other sources etc.)
- ▶ microbiological pollutants (faecal pathogens)
- ▶ plastics, including microplastics
- ▶ a wide range of other hazardous substances (for example industrial products and solvents), and
- ▶ general litter.

Urban development significantly increases the amount of impervious land surface (e.g. roads, roofs, driveways, car parks) in developed catchments, which reduces the amount of rainfall that infiltrates soil throughout the catchment, and instead creates large volumes of stormwater runoff that create 'flashy' flows in waterways during storm events (i.e. short duration, high velocity flows). In contrast, where rainfall can infiltrate soil, water seeps more slowly to waterways as subsurface flows, creating longer duration and lower velocity flows in waterways. Thus, urban development significantly modifies the hydrology of urban waterways. Furthermore, the high velocity of flashy flows in urban catchments means that they cause increased rates of erosion and can transport more sediment than more natural lower

velocity flows. In Redlands Coast, upper catchment areas typically have lower proportion of urban development, and higher proportion of native vegetation cover, than lower catchment areas.

Channelisation (i.e. straightening, shortening and often concrete-lining) of waterways is an additional impact on urban waterways, resulting in modified hydrology and significantly impacted habitat. Direct modification to flows and habitat has also occurred with the infilling of wetlands, mangroves and saltmarsh habitats, particularly across lower Tingalpa, Coolwynpin and Eprapah creeks. Canal estates have been constructed in some areas, such as Raby Bay, Sovereign Waters and Aquatic Paradise. However, mangroves are retained along many shorelines and in estuarine reaches of most waterways, including Tingalpa, Coolwynpin and Eprapah creeks. Instream dams and weirs for water storage further modify flows in some waterways and create barriers to fish migration, with road crossings of waterways also having the potential to impact fish migration when crossings do not incorporate design features that enable fish passage. There are some 281 fauna barriers on Redlands Coast waterways on the mainland, which gives about 4.2 potential in-stream barriers per km² of Redlands Coast mainland. A review of fauna barriers identified that Redlands Coast has five of the top 50 barriers to fish passage across greater Brisbane.



Credit Ruth Venner

Clearing of riparian vegetation changes light and thermal regimes of instream environments, which can facilitate excessive algal growth in the presence of high nutrient concentrations. Riparian vegetation contributes important components of instream aquatic habitats (e.g. leaves, fruits and branches, that contribute to food webs and habitat diversity), and buffers sediment and diffuse pollution sources; thus, cleared riparian vegetation impacts instream food webs and habitats, and ensures higher rates of transfer of sediment and pollutants to waterways compared to those with vegetated riparian zones.

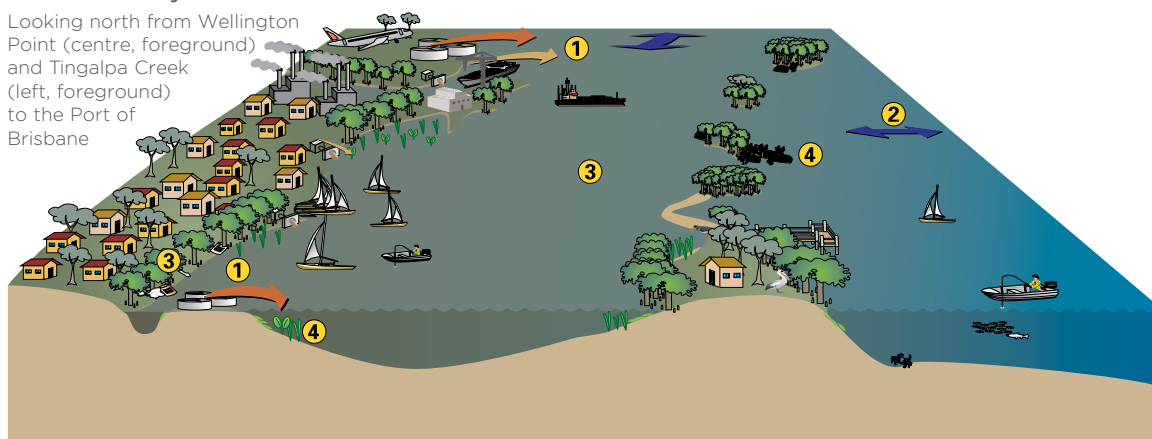
Urban waterways with modified hydrology, modified channel structure, high pollution and sediment loads and cleared riparian vegetation enable pest fish (e.g. eastern Gambusia and Tilapia) to establish large populations. Pest fish can

compete with, prey directly on juveniles and impact water quality and habitat quality, thereby exacerbating land use impacts on waterway health.

Impacts in rural environments include point and diffuse pollution and sediment sources, cleared riparian vegetation, stock access to waterways, instream weirs and farm dams through the catchment. Stock access to waterways cause trampling of banks and aquatic habitat, which can lead to decreases bank and bed stability and erosion. Farm dams intercept stormwater runoff that has the ultimate effect of reducing the overall volume of water available for stream flow; thus, farm dams can influence stream hydrology (especially when there are a large number of farm dams in a catchment). It is estimated that there are some 1400 artificial dams in Redlands Coast.

Waterloo Bay

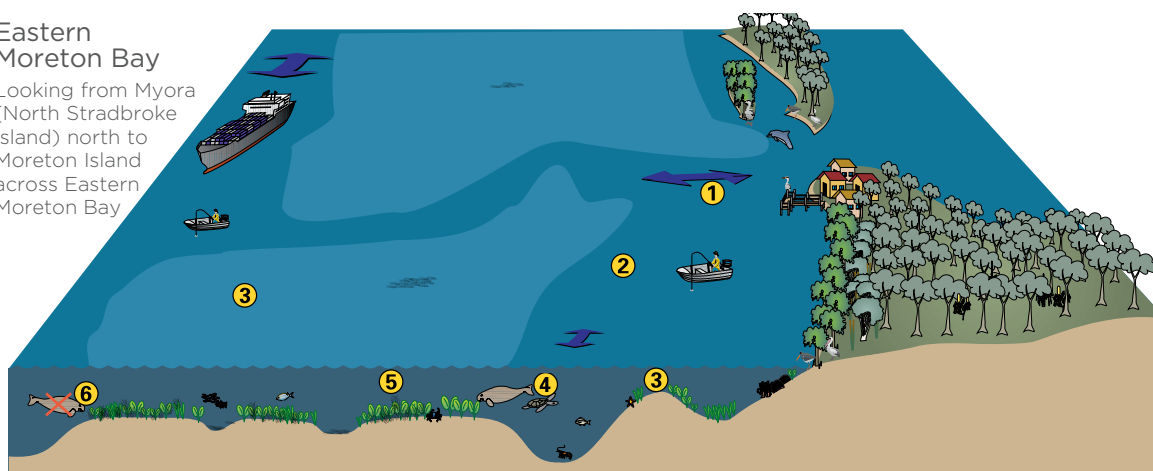
Looking north from Wellington Point (centre, foreground) and Tingalpa Creek (left, foreground) to the Port of Brisbane



- 1 Sediment and nutrient inputs from Brisbane River, Tingalpa Creek, and numerous creeks and stormwater drains
- 2 Flushing occurs from tidal exchange through North and South Passages
- 3 There is a steep water quality gradient from shore to Bay
- 4 Seagrass beds remain in shallow areas of western shore. Corals occur on fringing islands

Eastern Moreton Bay

Looking from Myora (North Stradbroke Island) north to Moreton Island across Eastern Moreton Bay



- 1 Tidal flushing through the North and South Passages
- 2 Eastern Moreton Bay has clear, blue and clean water
- 3 Amity and Moreton Banks support extensive seagrass beds
- 4 Populations of dugongs and turtles and fish feed on the seagrass beds
- 5 Lyngbya blooms blanket large areas of seagrass beds
- 6 Lyngbya deters dugong grazing

Figure 6: Simple conceptual model of areas of Moreton Bay including pressures.

Source: Healthy Waterways (2014) Moreton Bay Simple Conceptual Model. Brisbane: Healthy Land and Water.

6.2 Climate Change

Climate change is caused by increased concentrations of greenhouse gases in the atmosphere, primarily from anthropogenic activities such as burning fossil fuels, deforestation, and farming. Australia faces significant environmental, economic and social impacts from climate change, and is one of the largest producers of carbon dioxide emissions relative to the rest of the world, with roughly four times the world average for emissions per capita.

Climate change predictions indicate that the severity and frequency of extreme events may increase. South East Queensland has experienced some such extreme weather events, including heatwaves, droughts, floods, bushfires and severe storms (Figure 6, Appendix 3). In recent history, South East Queensland has experienced: the Millennium Drought (1995–2009), destructive cyclonic events (Yasi 2011, Oswald 2013, Ita 2014, ex-tropical cyclone Debbie 2017), and significant bush fires (Minjerribah 2014, 2018 and Russell Island 2017).

Climate change is one of the most important factors linked to current declines in global biodiversity. The impact of climate change on aquatic systems are likely to be complex and relate to changes in thermal and hydrological regimes, with changing rainfall patterns influencing stream hydrology and rising mean sea level influencing the hydrology along

coasts and in waterways. A range of water quality and ecological changes are likely to occur under new thermal and hydrological regimes, and impacts pathways will likely be complex, such as cascading impacts along food chains.

In 2030, Brisbane’s climate will be more like the climate of Bundaberg

Migration (i.e. spatial movement) to one of the dominant strategies that ecosystems and species can be resilient and adapt to climate change. For example, fish may need to migrate across latitude or elevation, and coastal habitats may need to migrate inland. Key strategies for resilience to climate change by our key aquatic assets include maintain buffers around low lying coastal areas and minimising cumulative impacts to waterways (e.g. riparian vegetation to improve instream thermal regulation; remove waterway barriers to enable fauna movement).

With timely and effective planning and interventions, climate risks can be better managed for increased resilience to climate change impacts by Redland Coast’s waterways and Moreton Bay.






7.0 Focus on Recent Activity

Council is committed to protecting, maintaining and restoring the ecological health and values of the creeks and bay. This is evident in the various activities and programs Council undertakes (Figure 6, Appendix 2).


While Council has invested significant resources in on ground activities to improve water quality and aquatic ecosystem health, significant opportunities still exist for Redlands Coast to protect and enhance the resilience of the waterways.

PRIVATE LAND



Environmental partnership programs

Voluntary programs with private landholders to manage their properties for improved environmental outcomes. The Waterway Extension Program provides support and incentives to landholders in priority catchments.



Erosion and sediment control program


Educates and regulates compliance on construction sites.

Community education programs

- Discovery Centre and workshops at IndigiScapes
- School holiday program
- Education programs in schools and childcare centres.
- Regular social media posts and newsletters.

Investigate water pollution incidents


Investigates, educates and regulates pollution incidents.



Development assessment teams

Assesses development against City Plan, including Healthy Waters Code

MONITORING PROGRAMS




Waterways health monitoring programs

Monitoring occurs across Redlands Coast. Environmental relevant activities and licences monitoring


Regular aquatic habitat assessments

Surveys occur every three to four years of aquatic habitat, including native fish, pest fish and water bugs (aquatic macroinvertebrates).



Water recreation management program

Monitoring at priority location.




Harmful blooms program

Actively monitor and respond to concerns at priority locations.


Monitoring of the operations of infrastructure, such as wastewater network.

PUBLIC LAND




Environmental Management System

Enables Council activities to reduce environmental impact
Ensures Council activities meet statutory and corporate goals
Adopts the principles of ISO14001



Community Bushcare program

Over 38 Bushcare groups supported by Council working throughout Redlands Coast to restore areas. Creek Crew program is a group focused on waterways that monitors water quality, fish assessments and creek side restoration.




Waterweed management

Actively control aquatic weeds at priority locations.


Riparian weed management

Actively control riparian weeds at priority locations.




Conservation and land management program

Council manages numerous parks and conservation areas.



Road cleaning program

Active program, cleaning roads removing pollutants.



Stormwater and wastewater asset management program

Manages greater than \$2.5 million worth of stormwater quality improvement devices.

Waste and Wastewater Management

Waste transfer stations
Wastewater treatment plants

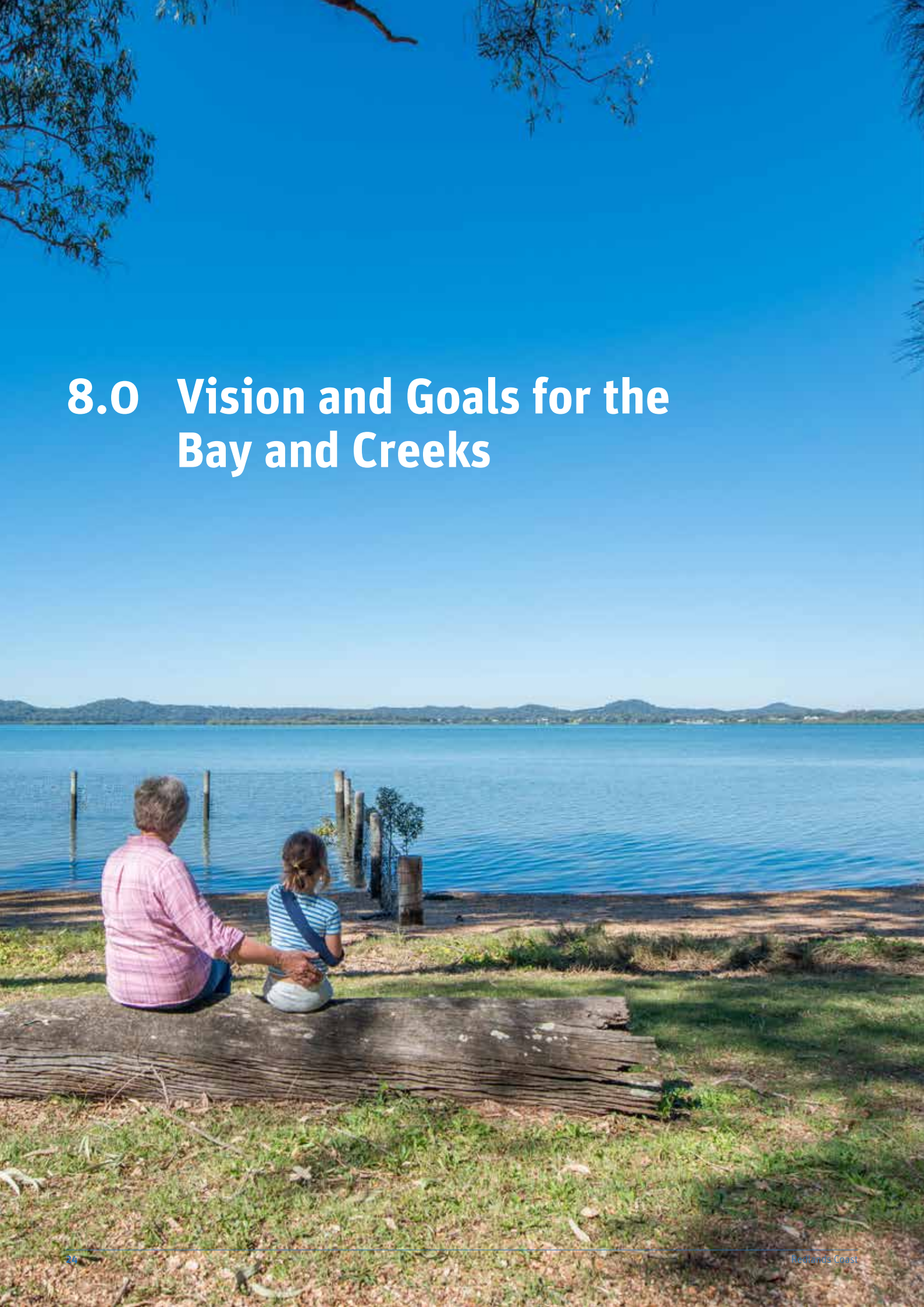
Road sealing program

Active program, sealing priority dirt roads across the city.

Provide support to multiple community groups who facilitate activities.

Figure 7. Examples of key Redland City Council programs that contribute to protecting and enhancing the value of Redlands Coast waterways and Moreton Bay. Refer to Appendix 2 for 2019/20 highlights.

8.0 Vision and Goals for the Bay and Creeks



As the Redlands Coast population grows and experiences a changing climate our creeks and Moreton Bay are likely to come under increasing pressure. Proactive management

is needed to protect the environment and sustain environmental values and ecosystem services that our creek and the Bay provides to the community.

Vision

Working together to protect and enhance the resilience of the creeks and Moreton Bay for a sustainable future.

Resilience is the ability of the environment to withstand or recover from a shock or disturbance.

Goals

Four goals have been identified to achieve the vision of protecting and enhancing resilience of the creeks and Moreton Bay.

Decisions Based on Science

Strengthen science-based knowledge of the effects of climate change and population growth on the health and resilience of the waterways to ensure management actions meet current and future needs.

Protect Creek and Bay Assets

Minimise harm to the creeks and bay from pollution, by prioritising the quality of urban runoff, management of stormwater and natural assets, and protecting existing instream, wetland and creek bank vegetated ecosystems.

Restore Degraded Systems

Restore resilience of the creeks and the Bay by improving habitats, biodiversity, connectivity and natural flows through corrective remediation works including actively eroding areas.

Community Making a Difference

Increase community stewardship and connection to the bay and creeks, through education and partnerships.

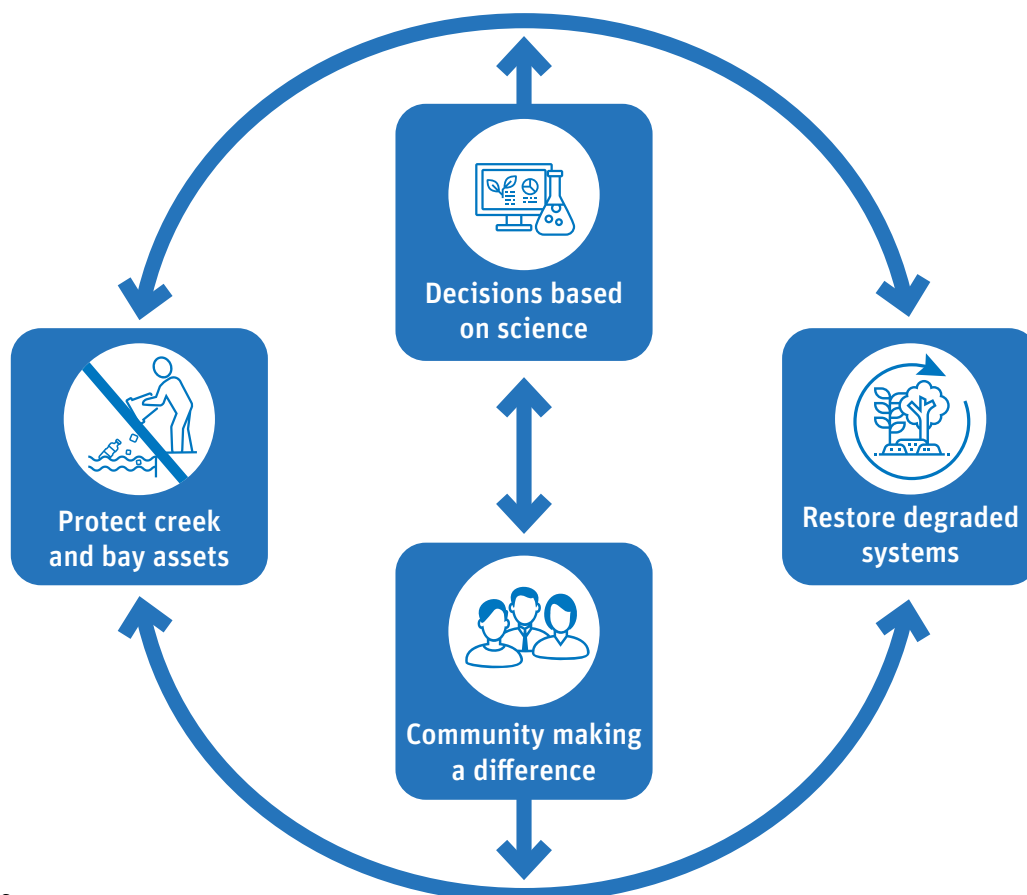
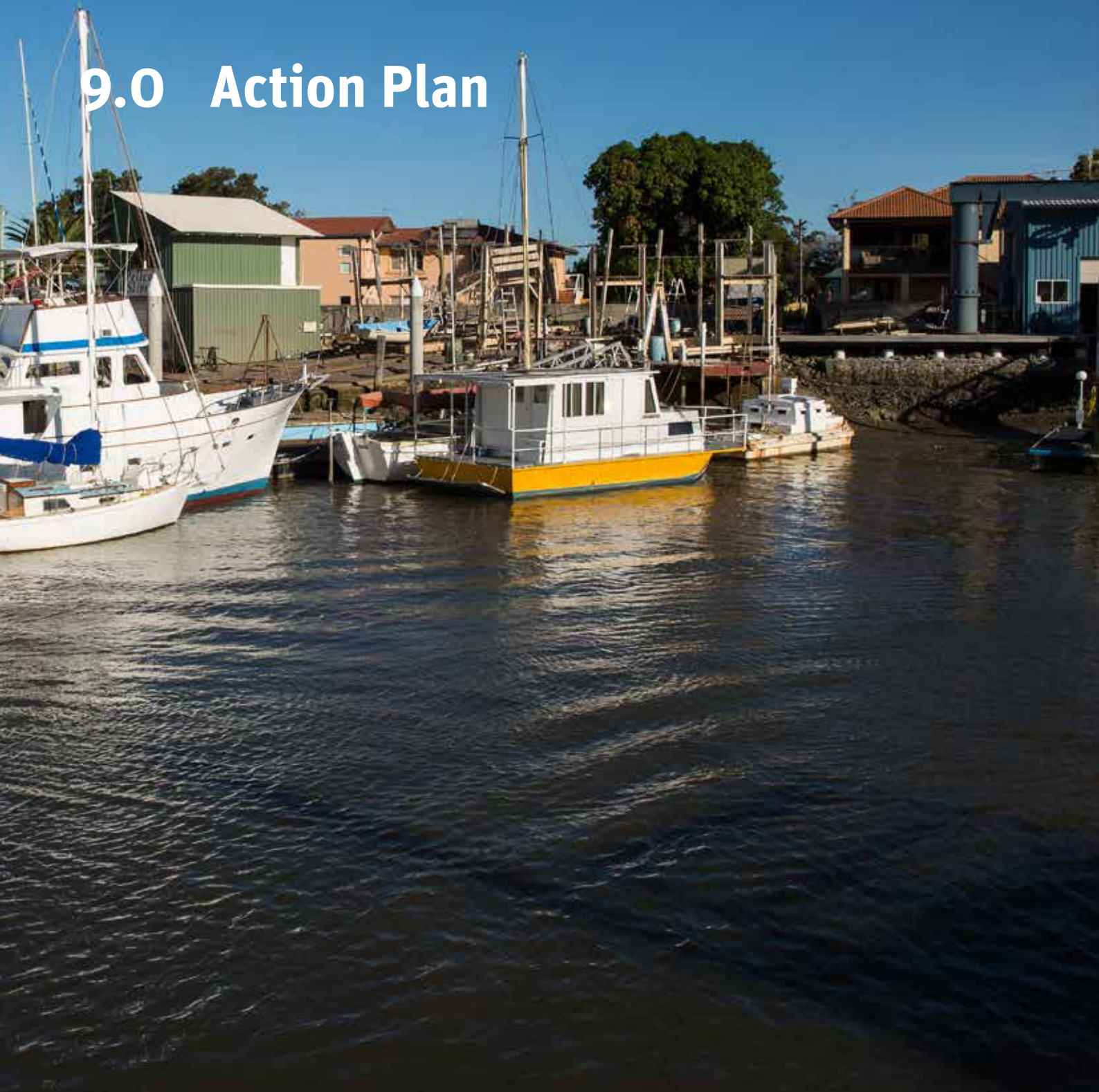


Figure 8: Goals

9.0 Action Plan





The supporting *Redlands Coast Bay and Creeks Action Plan* lists the key actions and performance measures under the key goals:

- ▶ Decisions based on Science
- ▶ Protect Creeks and Bay Assets
- ▶ Restore Degraded Systems
- ▶ Community Making a Difference

The Plan and supplementary Action Plan align with and operationalises Council's implementation of the Lower Brisbane-Redlands Coastal Catchment Action Plan (CAP) that Council endorsed in 2018.

Where conflict exists between proposed management actions, the cost benefit of the of proposed volume reduction of a pollutant by the proposed action (where known or easily calculated) and the significance of the receiving environment should be used to decide between actions. When considering between the potential pollutant types, the impact of that pollutant type should also be considered.

Refer to the supporting *Redlands Coasts Bay and Creeks Action Plan 2021–2026* for the detailed prioritised actions.

Monitoring of Action Plan Implementation

The implementation of the actions in the plan will be reviewed annually. The review will assess the success of each action based on the 'Performance Measures' listed in the *Bay and Creek Action Plan*. Information from each of the Council areas and external partners will be collated for the annual review.

If available, updated mapping and other environmental data sets will be used to monitor changes to the values, attributes and threats of the creek and Moreton Bay.

Funding of the priority actions is critical for their success and the performance of this plan. Delivery of the action plan will be funded through a combination of business as usual, general revenue, environment separate charge, reserve funds and resources obtained through external funding sources such as Resilient Rivers Initiative, and City Deals initiatives under the *Smart Cities Plan*.

10.0 References

- Accad, A., Li, J., Dowling, R., & Guymer, G. P. (2016). *Mangrove and Associated Communities of Moreton Bay, Queensland, Australia: Change in Extent 1955-1997-2012*. Brisbane: Queensland Herbarium, Department of Science, Information Technology and Innovation.
- Australian Government Australian Bureau of Statistics. (2020). *Regional Population Growth, Australia, 2018-19*. Canberra: Commonwealth of Australia.
- Australian Government Bureau of Meteorology. (2020). *State of the Climate 2020*. CSIRO. Australian Government. Retrieved from <http://www.bom.gov.au/state-of-the-climate/documents/State-of-the-Climite-2020.pdf>
- Australian Government Department of Environment and Energy. (2019). *Environment Protection and Biodiversity Conservation Act Protected Matters Report - Redland City*. Commonwealth of Australia.
- Australian Government Department of Environment and Energy. (2019). *EPBC Act Protected Matters Report - LGA Redland City, Qld*. Brisbane: Commonwealth of Australia.
- Brown, R., Rogers, B., & Werbeloff, L. (2016). *Moving Toward Water Sensitive Cities: A Guidance Manual for Strategists and Policy Makers*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities Pty Ltd.
- Council of Mayors. (2019). *Council of Mayors – South East Queensland Annual Report 2017/18*. Brisbane: Council of Mayors South East Queensland.
- CSIRO. (2006). Water Sensitive Urban Design. In *Urban Stormwater: Best Practice Environmental Management Guidelines*. CSIRO Publishing.
- Dudgeon, D., Arthington, A. H., Gessner, O., Kawabata, Z., Knowler, D. J., Lévêque, C., . . . Sullivan, C. A. (2006). Freshwater Biodiversity: Importance, Threats, Status and Conservation Challenges. *Biological Reviews*, 81(2), 163-182.
- Fischer, M., Burns, D., Bolzenius, J., Costello, C., & Low Choy, D. (2019). Quandamooka Country: The role of science and knowledge in Traditional. In I. R. Tibbetts, P. C. Rothlisberg, D. T. Neil, T. A. Homburg, D. T. Brewer, & A. H. Arthington (Eds.), *Moreton Bay Quandamooka & Catchment: Past, present, and future*.
- Fonseca, M. S. (1996). The Role of Seagrass in Nearshore Sedimentary Processes: A Review. In *Estuarine Shores: Hydrological, Geomorphological and Ecological Interactions*. Boston: Blackwell Science.
- Grill, G., Lehner, B., Thieme, M., Geenen, B., Tickner, D., Antonelli, F., . . . Olden, J. D. (2019). Mapping the World's Free-Flowing Rivers. *Nature*, 569, 215-221.
- Healthy Land and Water - Water by Design . (2013). *Benchmarking Erosion and Sediment Control Performance in South East Queensland*. Brisbane: Healthy Land and Water.
- Healthy Land and Water. (2016). Notes from the Workshop Titled 'Erosion and Sediment Control in the Building Sector: A Workshop to Identify Key Issues and Solutions in SEQ'. *Erosion and Sediment Control Community of Practice (Building Sector)*.
- Healthy Land and Water. (2018). *Sustainable Pollutant Loads for Target Setting*. Brisbane: Healthy Land and Water Ltd.
- Healthy Land and Water. (2019, April 2019). *Experts warn community apathy could kill Moreton Bay*. Retrieved February 12, 2020, from Healthy Land and Water News Room: <https://hlw.org.au/newsroom/experts-warn-community-apaty-could-kill-moreton-bay/>
- Healthy Land and Water. (2021, January). *Erosion and Sediment Control*. Retrieved from Healthy Land and Water Website: <https://hlw.org.au/project/erosion-and-sediment-control-esc/>
- Healthy Land and Water Ltd. (2018). *Sustainable Pollutant Loads for Target Setting EHP Target Loads Modelling*. Brisbane: Healthy Land and Water Ltd.
- Healthy Land and Water. (Various year). SEQ Erosion and Sediment Control and Urban Stormwater Community of Practice, Workshop Outcomes.
- Healthy Land and Waters. (Various Years). *South East Queensland Report Card*. Brisbane: Healthy Land and Waters.
- Jackson, W. J., Argent, R. M., Bax, N. J., Bui, E., Clark, G. F., Coleman, S., . . . Wienecke, B. (2016). Overview: Pressures. In *Australia State of the Environment 2016*. Canberra: Australian Government Department of the Environment and Energy.
- Jenkins, G., Wheatley, M., & Poore, A. (1996). Spatial Variation in Recruitment, Growth and Feeding of Post-Settlement King George Whiting, *Sillaginodes punctata*, Associated with Seagrass Beds of Port Phillip Bay, Australia. *Canadian Journal of Fisheries and Aquatic Sciences*, 53, 96-105.
- Knight, J. (2018). *Review of Saltmarsh Rehabilitation Projects*. Prepared for the Saltmarsh for Life Committee, Healthy Land and Water, Report Accepted 2018.
- Limnologic. (2012). *Identification, Characterisation and Prioritisation of Artificial Waterbodies on Council Land (Redland City Council)*. Redland City.
- Macreadie, P. I., Anton, A., & Duarte, C. M. (2019). The future of Blue Carbon science. *Nature Communications*, 10 (3998).
- McGrath, C. (2018). *Synopsis of the Queensland Environmental Legal System. (6th Edition)*. Brisbane: Environmental Law Australia.
- Meyer, J. (2018, December 20). *Land and Water Media Release - Experts Warn Community Apathy Could Kill Moreton Bay*. Retrieved from <https://HLW.org.au/newsroom/experts-warn-community-apaty-could-kill-moreton-bay>

- Moore, M., McCann, J., & Power, T. (2018). *Greater Brisbane Fish Barrier Prioritisation*. Brisbane: Catchment Solutions Pty Ltd.
- Queensland Government. (2017). *Pathways to a climate - Queensland Climate Adaption Strategy 2017-230*. Department of Environment and Heritage Protection.
- Queensland Government - Queensland Treasury. (2018). *Medium Series Projection*. Queensland Government Statistician's Office.
- Queensland Government. (2016). *Walking the Landscape – Redlands Catchment Map Journal*. Brisbane: Department of Environment and Science, Queensland.
- Queensland Government. (2018). *South East Queensland Economic Foundations Paper*. Brisbane: Queensland Government.
- Queensland Government. (2021). *The Long Paddock*. Retrieved from Queensland Future Climate Dashboard: <https://longpaddock.qld.gov.au/qld-future-climate/dashboard/#responseTab1>
- Queensland Government Department of Environment and Heritage Protection. (2016). *Draft Climate Change in the South East Queensland Region*. Brisbane: Department of Environment and Heritage Protection.
- Queensland Government Department of Environment and Science Queensland. (2019). Information Sheet - Ramsar Site 631. Moreton Bay - Australia. Queensland Government.
- Queensland Government Department of Environment and Science Queensland (2019). *Marine Park Moreton Bay Zoning Plan*. The State of Queensland.
- Queensland Government Department of Infrastructure, Local Government and Planning. (2017). *Shaping South East Queensland*. Brisbane: Department of Infrastructure, Local Government and Planning.
- Redland City Council. (2014). *Redland City Economic Development Framework 2014 - 2041*. Redland City.
- Redland City Council. (Various year). *Redlands Coast Annual Waterway*. Redland City: Redland City Council.
- Resilient Rivers Initiative. (2018). *Lower Brisbane-Redlands Coastal Catchment Action Plan 2018 - 2021*. Brisbane: Council of Mayors South East Queensland.
- Resilient Rivers Initiative. (2018). *Lower Brisbane-Redlands Coastal Catchment Action Plan 2018 - 2021*. Brisbane: Council of Mayors South East Queensland.
- Ross, H., Jones, N., Witt, K., Pinner, B., Shaw, S., Rissik, D., & Udy, J. (2019). Values towards Moreton Bay and catchments. In I. R. Tibbetts, P. C. Rothlisberg, D. T. Neil, T. A. Homburg, D. T. Brewer, & A. H. Arthington (Eds.), *Moreton Bay Quandamooka & Catchment: Past, present, and future*. The Moreton Bay Foundation.
- Saskia, T., Furukawab, T., Iwasakic, Y., Seto, M., & Morib, A. S. (2015). Perspectives for Ecosystem Management Based on Ecosystem Resilience and Ecological Thresholds Against Multiple and Stochastic Disturbance. *Ecological Indicators*, 57, pp. 395-408.
- Saunders, M. I., Leon, J., Phinn, S. R., Callaghan, D. P., O'Brien, K. R., Roelfsema, C. M., . . . Mumby, P. J. (2013). Coastal Retreat and Improved Water Quality Mitigate Losses of Seagrass from Sea Level Rise. *Global Change Biology*, 19(8), 2569-2583.
- Thurstan, R., Fraser, K., Brewer, D., Buckley, S., Dinesen, Z., Skewes, T., . . . Pollock, B. (2019). Fishers and Fisheries of Moreton Bay. In I. R. Tibbetts, P. C. Rothlisberg, D. T. Neil, T. A. Homburg, D. T. Brewer, & A. H. Arthington, *Moreton Bay Quandamooka & Catchment: Past, Present, and Future*. Brisbane, Australia: The Moreton Bay Foundation.
- Tibbetts, I. R., Rothlisberg, P. C., Neil, D. T., Homburg, T. A., Brewer, D. T., & Arthington, A. H. (Eds.). (2019). *Moreton Bay Quandamooka & Catchments*. Brisbane: The Moreton Bay Foundation Limited.
- Tickner, D., Opperman, J., Abell, R., Acreman, M., Arthington, A. H., Bunn, S. E., . . . Young, L. (2020). Bending the Curve of Global Freshwater Biodiversity Loss: An Emergency Recovery Plan. *BioScience*, 70(4), 330-342.
- Waycott, M., McMahon, K., Mellors, J., Calladine, A., & Kleine, D. (2004). *A Guide to Tropical Seagrasses of the Indo-West Pacific*. Townsville: James Cook University.
- Zeigler, S., & Benner, R. (1999). Nutrient Cycling in the Water Column of a Subtropical Seagrass Meadow. *Marine Ecological Progress Series*, 188, 51-62.

11.0 Appendix 1 – Relevant Legislation

Relevant legislation to the management the waterways and Moreton Bay. Source for International, Commonwealth and State legislation text summarised from McGrath (2018)

International

- ▶ Biodiversity Convention 1992
- ▶ Ramsar Convention on Wetlands 1971
- ▶ United Nation Framework Convention on Climate Change 1992
- ▶ United Nations Convention on the Law of the Sea 1982
- ▶ Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- ▶ Bilateral migratory bird agreements
 - ▷ JAMBA, CAMBA and ROKAMBA
- ▶ Agreement on the Conservation of Albatrosses and Petrels (ACAP)
- ▶ East Asian - Australasian Flyway Partnership

Commonwealth

- ▶ *Environment Protection and Biodiversity Conservation Act 1999*

Queensland Government

- ▶ *Local Government Act 2009*
- ▶ *Planning Act 2016*
- ▶ State Planning Policy—Water Quality
- ▶ *Environmental Protection Act 1994*
- ▶ Environmental Protection Policy
 - ▷ *Environmental Protection (Water and Wetland Biodiversity) Policy 2019.*
 - ▷ *Environmental Protection (Water) Policy 2009 – Water Quality Objectives and Environmental Values*

- ▶ *Water Act 2000*
- ▶ *Fisheries Act 1994 - Declared Fish Habitat Areas, for any development that involves impacts on marine plants, declared Fish Habitat Areas*
 - ▷ Queensland Sustainable Fisheries Strategy (2017–27)
- ▶ *Marine Parks Act 2004*
 - ▷ Marine Parks Regulation 2017
 - ▷ Marine Parks (Moreton Bay) Zoning Plan 2019
- ▶ *Coastal Protection and Management Act 1995*
- ▶ *Environmental Offsets Act 2014*
- ▶ *Nature Conservation Act 1992*
- ▶ *Vegetation Management Act 1999*
- ▶ *Biosecurity Act 2014*
- ▶ *Soil Conservation Act 1986*
- ▶ *Queensland Heritage Act 1992*
- ▶ *Native Title Act 1993*
- ▶ *Aboriginal Cultural Heritage Act 2003*
- ▶ *North Stradbroke Island Protection and Sustainability Act (2011)*
- ▶ *Economic Development Act 2012*
- ▶ *South East Queensland Water (Distribution and Retail Restructuring) Act 2009*
- ▶ *Water Supply (Safety and Reliability) Act 2008*
- ▶ *Waste Reduction and Recycling Act 2011*

Regional

- ▶ Managing Natural Assets for a Prosperous SEQ 2014-2031
- ▶ Shaping SEQ - South East Queensland Regional Plan 2017
- ▶ SEQ Water Strategy 2010

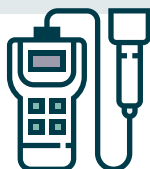
12.0 Appendix 2 – 2019–2020 Bay and Creek Activity Highlights

DECISIONS BASED ON SCIENCE

Monitored

225 water samples collected from swimming beaches to monitor pathogens

44 sites regularly monitored for water quality



Assessed

20 sites evaluated for aquatic habitat condition, native and pest fish, along with aquatic macroinvertebrates



PROTECT RESILIENCE OF OUR BAY AND CREEKS

Removed

84m³ of litter collected from conservation areas



27m³ of litter collected from stormwater

143m³ of sediment collected from gross pollutant traps

Responded

investigated concerns highlighted by the community, including

74 for erosion and sediment control

37 for dust



247 for litter

RESTORE DEGRADED SYSTEMS

Restored

28,808m³ riparian areas revegetated

16,591 riparian and foreshore native plants established



6135 riparian or wetland flora species planted by volunteers



12,092 flora species planted through Environmental Partnership programs

Controlled

46 sites treated for aquatic weeds
11 Council managed waterbodies targeted with biological control - salvinia weevil
9 private properties managed for aquatic weed with salvinia weevil through Environmental Partnership program



COMMUNITY MAKING A DIFFERENCE

Engaged

919 students at schools and childcare centres enjoyed waterway training

500 properties participated in Environmental Partnership programs



12 waterway call for action posts on social media

7 creek working bees undertaken by Creek Crew volunteers, who monitored fish, collected rubbish and removed weeds

3 waterway workshops held on floating wetlands, macroinvertebrates and weeds



13.0 Appendix 3 – Management Plans and associated documents

The identified plans and documents listed below have been consulted during the development of the Redlands Coast Bay and Creeks Plan and Action Plan.

- ▶ Lower Brisbane-Redlands Coastal Catchment Action Plan 2018 – 2021 (2018)
- ▶ Catchment prioritisation and mapping of riparian soils and landforms -Mainland (2009)
- ▶ Total Water Cycle Management Plan (2013)
- ▶ Waterway Management Plans (2013)
- ▶ Native Dog Creek and Torquay Creek - Southern Redland Bay Catchment (part 22) Integrated Waterways Planning report (2010)
- ▶ Erapah Creek Waterway Management Plan (2004)
- ▶ Hilliards Creek Catchment Waterways Health Assessment (Water and Environment City Design) (2002)
- ▶ Coolnwynpin Creek (Glover Drive) Reach Management and Rehabilitation Strategy Management Strategies (2008)
- ▶ Hilliards Creek Waterway Management Plan (2005)
- ▶ Tarradarrapin Creek Wetlands Planning and Management (1996)
- ▶ Tingalpa Creek Catchment Waterway Management Plan (2002)
- ▶ Fish Barrier Assessment Guidelines (2010)
- ▶ Aquatic Habitat Assessments of Redland City Freshwater Creeks (various years)
- ▶ Catchment Prioritisation and Mapping of Riparian Soils and Landforms for Redland City (Mainland) (2009)
- ▶ Fish Populations in Artificial Waterbodies in Redland City (2012)
- ▶ Redland City Council Pest Management Plan Supporting Technical Study: Identification of Aquatic Ecological Assets, Hazards and Management Priorities (2018)
- ▶ Redland City Council, Fish, Creeks and Us Project - Stocking Plan (2010)
- ▶ Redland Waterways Assessment and Priority Plan (2007)

Wetlands

- ▶ Whistling Kite and Turtle Swamp Conservation Areas Management Plan (2007)
- ▶ Orchard Beach Wetland Management Plan (2004)
- ▶ Tarradarrapin Creek Wetlands Management Plan


Dam/lakes


- ▶ Management Plan (Sovereign Waters Estate Lake, Leslie Harrison Dam)
- ▶ Identification, characterisation and prioritisation of artificial water bodies on Council land
- ▶ Downstream Water Quality Impacts Artificial Lakes and farm dams (2011)
- ▶ Water Quality Improvement Measures for AWBs (2012)

Bay/Coastal

- ▶ Flinders Beach Land Management Plan 2005-2009 (2005)
- ▶ Victoria Point Shoreline Erosion Management Plan (2010)



 redland.qld.gov.au

 3829 8999

