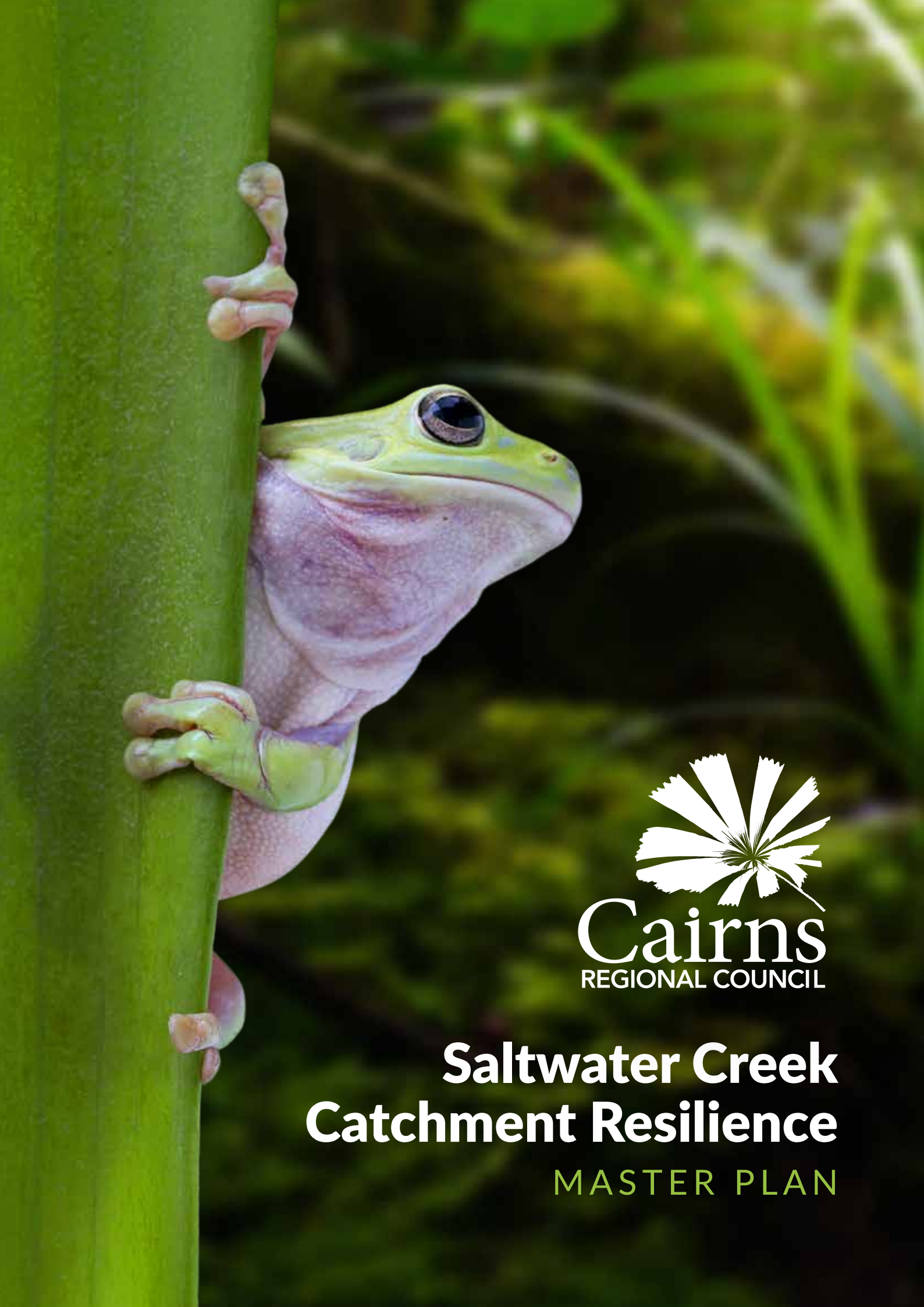


Cairns
REGIONAL COUNCIL

# Saltwater Creek Catchment Resilience

## MASTER PLAN

## Acknowledgement of Country

Cairns Regional Council acknowledges and pays our respects to the Traditional Custodians of our region, the Djabugay; Yirrganydji; Buluwai, Gimuy Walubara Yidinji; Mandingalbay Yidinji; Gunggandji; Dulabed and Malanbara Yidinji; Bundabarra and Wadjanbarra Yidinji; Wanyurr Majay; Mamu and NgadjonJii peoples.

We extend this respect to all elders past, present and future, and other First Peoples within our region.

**Prepared for**

Cairns REGIONAL COUNCIL

**Consulting Team**

BMT

# Contents




Saltwater Creek Catchment Resilience Master Plan and Implementation Plan is developed with funding from Federal Government grant - The Preparing Australian Communities - Local Stream.

Final version - September 2025

# Introduction

## Saltwater Creek Catchment (SWCC) is a small coastal catchment in Cairns that flows from the foothills of Mount Whitfield into the Great Barrier Reef lagoon.

Saltwater Creek, Lily Creek and Hamliffe Creek are the three main tributaries within the catchment and represent significant urban waterways in Cairns, flowing through residential, commercial and industrial areas before discharging into the bay. Saltwater Creek, along with its various mangroves, wetlands, and riparian corridors, provides crucial ecosystem services to the surrounding catchment and holds deep cultural significance for the Traditional Custodians in the catchment, the Gimuy Walubara Yidinji and Yirrganydji peoples.

Despite its importance to the surrounding environment, the health of Saltwater Creek Catchment is threatened by a range of stressors, including urban development, pollution and climate change.

By integrating Traditional Ecological Knowledge (TEK), community priorities, and scientific expertise, a Catchment Master Plan can guide the design and implementation of initiatives to improve catchment health and enhance regional resilience.

## Traditional Custodian History and Significance

The SWCC lies within the traditional lands of the Gimuy Walubara Yidinji and Yirrganydji people. These Traditional Custodian groups have a long-standing connection to the land, waterways, and surrounding environments, with the SWCC making up a significant part of their cultural and ecological landscape.

The Gimuy Walubara Yidinji and the Yirrganydji people have maintained their responsibilities as custodians of the catchment for thousands of years. As custodians, both groups are committed to preserving the balance and health of the catchment's ecosystems to preserve their traditional ways of life and connection to Sea and Country. This is based on a deep understanding that the health of the catchment is intimately linked with the well-being of the people who live there.

Traditional Custodians play a vital role in catchment management by contributing their TEK, lived experience, and perspectives to planning, decision-making, monitoring, and ecosystem restoration efforts. TEK systems—such as seasonal indicators, fire management, and cultural site protections—should be integrated into decision-making through collaboration between Traditional Custodians, local government, and environmental organisations.

## Why develop a Resilience Master Plan?

The development of the SWCC Resilience Master Plan (the Master Plan) provides a strategic, integrated framework for managing water, land, ecosystems, and community assets within the catchment to reduce risk, build climate resilience, support biodiversity, and ensure long-term liveability, productivity, and sustainability for the community now and into the future.

This Master Plan promotes both a catchment-scale and place-based approach that recognises the unique characteristics of each sub-catchment while fostering collaborative partnerships between Traditional Custodians, community members, local stakeholders, and technical experts. It strengthens resilience in both ecosystems and communities by addressing the challenges of flooding, heat, and climate change through integrated, nature-based solutions. The health of Saltwater Creek is also closely connected to the broader health of the Great Barrier Reef, highlighting the importance of coordinated action to improve water quality and catchment management. Together, these efforts ensure that the catchment continues to support cultural values, community wellbeing, and environmental sustainability for generations to come.

CASE STUDY

## City Precincts Project: Shaping a More Liveable, Connected, and Sustainable Cairns

The **Cairns City Urban Precincts Regeneration Project** is transforming our city into a more vibrant, liveable, and connected place for the future.

Led by Cairns Regional Council, the project sets a plan to improve urban amenity, resilience, and habitat, so that the Cairns City remains a healthy and connected place to live as the population in this area grows. The plan focusses on enhancing housing options, improving urban design, and creating welcoming public spaces that bring people together. A key site in this transformation is **Lily Creek & the Cairns Council Depot site**, which offers a rare opportunity for large-scale regeneration. Plans for this area include a mix of housing to support a diverse and growing community, extensive creek rehabilitation through partnerships with Traditional Custodians and local groups, and new parkland to provide much-needed green space for residents.

These initiatives will improve creek health in the Saltwater Creek catchment more broadly by enhancing water quality and habitat health in the lower sub-catchment (e.g. more green space reduces urban runoff, filters pollutants and absorbs stormwater), promoting local and traditional ownership of environmental outcomes, and limiting urban sprawl through mixed-use developments. These initiatives also support broader conservation efforts, including improving water quality and reducing runoff to help protect the Great Barrier Reef.

# Vision and Principles

**This Master Plan is underpinned by a Vision and a set of principles which will guide the identification, prioritisation and implementation of management actions and activities into the future.**

## Vision

Saltwater Creek catchment is a thriving, resilient place where the creeks, ecosystems, and people are central to climate adaptation, community identity, local economy and shared well-being.

### Sustainable and safe

An equitable, liveable, and climate-resilient catchment. Achieved through whole of system planning and partnerships that address hazards including flooding, storm tide inundation and heat through enhancement of green and blue corridors.

### Waterways and Riparian Systems

Healthy, connected waterways that support biodiversity and ecological function. Enabled by creek naturalisation, riparian revegetation, stormwater upgrades, and support of natural habitats.

### Connected

A resilient, equitable catchment that connects people with place. Fostered through green spaces, shaded streets, community awareness and resilience building and active transport networks that support a strong, safe and healthy community for all.

### Cultural

A place that respects and reflects deep cultural connection to Country. Grounded in partnerships with Traditional Custodians, embedding Indigenous knowledge, values, and leadership in catchment planning and care.

# Salt Water Creek Catchment

## Healthy Catchment, Healthy People

Saltwater Creek catchment is a thriving, resilient place where the creeks, ecosystems, and people are central to climate adaptation, community identity, and shared well-being.

**We achieve this through:**

# SWCC

**S**ustainable

A safe, liveable, and climate-resilient catchment.

**W**aterway and Riparian Systems

Healthy, connected waterways that support biodiversity and ecological function.

**C**ultural

A place that respects and reflects deep cultural connection to Country.

**C**onnected

A resilient, equitable catchment that connects people with place.

# Guiding Principles

### Restore Ecosystem Health, Quality and Connectivity

Prioritise the restoration and maintenance of waterways and terrestrial habitats to support biodiversity and ecological balance while supporting the flood mitigation capacity of waterways. Recognise the role of the relationship between a healthy catchment and a healthy Great Barrier Reef (GBR).

### Engage and Collaborate with Traditional Custodians

Build meaningful and enduring collaboration with Traditional Custodians, ensuring their expertise, lived experiences, and cultural knowledge are central to the strategy's implementation.

Provide opportunities for Traditional Custodians to work on Country to lead and undertake restoration works and support culturally appropriate employment opportunities.

## Co-design Resilience and Make Room for the Creek

Facilitate community understanding of water cycle, catchment water flow, flooding risks, and the role of ecosystems in managing these dynamics. Build community capacities to live in the catchment with awareness of flooding issues.

Actively involve local organisations and stakeholders in making room for the creek and its associated processes. Enhance public awareness and emergency preparedness to accommodate changing climate risks including more frequent heavy rainfall patterns, heatwaves and sea level rise.

## Mainstream Monitoring, Evaluation, Reporting and Adaptive Management

Mainstream monitoring, reporting and evaluation processes into internal and external processes to ensure effective outcomes. Highlight successes and positive outcomes. Evaluate, refine and apply continuous improvement to keep achieving vision. Regularly report on project outcomes, successes, and ongoing challenges to maintain accountability and inform continuous improvement.

The Masterplan is supported by an internally focussed Living Saltwater Creek Resilience Implementation Plan. Both plans are continuously assessed for effectiveness and improvement based on new available data, technology and lived experiences.

## Ensure Community Safety and Wellbeing

Prioritise community safety in planning and implementation, addressing resilience to disasters, flood risks, and crime. Promote the activation of the SWCC by enhancing active transport, recreational spaces, Crime Prevention Through Environmental Design (CPTED) principles and equitable access to nature, ensuring all actions support overall community wellbeing and reduce flood risks to upstream and downstream areas.

## Strengthen Collaborative Partnerships

Strengthen partnerships with local and national organisations and stakeholders to achieve shared vision and goals and effective stewardship of the catchment. Examples include community and environmental groups, fishing organisations, natural resource management (NRM) groups, universities and Land and Sea Rangers.

## Incorporate Nature-Based Solutions

Focus on solutions that support re-wilding of the catchment, to restore the natural floodplain and slow down stormwater runoff. These include blue and green infrastructure solutions like wetland restoration, bank naturalisation, riparian revegetation, tree planting and water sensitive urban design (WSUD) to enhance ecological and community resilience.

## Empower and include all communities

Promote inclusivity and support the diverse needs of all communities within the catchment in the pursuit of shared resilience and well-being. Empower and uplift vulnerable and marginalised communities. Ensure Traditional Custodians and members of the local community have equal access to the benefits and opportunities arising from the catchment's development and resilience efforts.

## Implement a systems approach to resilience

Saltwater Creek and its sub-catchments form a complex, interconnected system where environmental health enhances community well-being as well as providing resilience benefits. A systems approach recognises that integrated solutions, such as flood management systems that also serve as green spaces, sports fields, and biodiversity habitats, can deliver benefits to both ecology and human quality of life. A healthy catchment is adaptive, supports vibrant ecosystems and promotes community health, creating lasting outcomes for people, nature and the Reef.

## Resilient Urban Planning

Improve and establish strong regulations for high-risk hazards areas (e.g. flood risk areas, hillslopes) through strategic framework and overlay codes. Promote flood resilient building designs and adopt water sensitive urban design principles.

Ensure high risk areas continue to be considered in future planning and approvals processes, with improved regulations to ensure this. Future development in the catchment should consider flooding both from rainfall events and storm tide inundation, heat and coastal hazard risks. Flood and climate resilient housing, green infrastructure, water sensitive urban design and retaining green space and shade trees are key considerations.


**Broad program logic for the Master Plan and Implementation Plan for Saltwater Creek Catchment showing how the actions in the implementation, deliver the intended outcomes of the Master Plan and ultimately deliver the Vision for the catchment.**

## Process for achieving the overall outcomes for a Resilient SWCC

The figure above demonstrates how this Master Plan will support the achievement of the Vision for SWCC. The Guiding Principles support the Vision and have been used to identify and prioritise actions for catchment remediation. These actions should underpin all future decisions and plans developed for the catchment. The Master Plan is complemented by the Implementation Plan that identifies several broad actions to be implemented in the short, medium and long term. Actions identified in the Masterplan and expanded upon in the Implementation Plan will result in positive impacts and outcomes, which cumulatively will support changing from the current state of the catchment to the achievement of the vision.

## Managing Urban Heat in the Saltwater Creek Catchment

With Cairns projected to experience longer and more intense heatwaves by 2090, addressing the urban heat island effect is a priority to enhance the resilience of both the catchment and the community.

Data from temperature sensors across Cairns show that areas with greater vegetation—such as Saltwater Creek's riparian corridors and newly landscaped streetscapes—experience noticeably lower temperatures than built-up zones.

To develop evidence-based actions, Cairns Regional Council has partnered with JCU and BMT to gain a detailed understanding of urban heat patterns. Findings from this research will inform targeted interventions in the Saltwater Creek catchment, ensuring a data-driven approach to urban cooling. Additionally, the Council is supporting an Urban Greening PhD project in collaboration with JCU and CSIRO to further advance heat mitigation strategies.

By combining nature-based solutions (e.g. restoration of natural creek buffers) with climate-sensitive urban design, Cairns Regional Council is working to mitigate urban heat, enhance community resilience, and create a cooler, more liveable environment. These greening initiatives also support broader conservation efforts, by improving water quality and reducing urban runoff into the Great Barrier Reef.

CASE STUDY

# 2 Context

*Saltwater Creek Today*

## Connectivity Among Sub-Catchments

### Upper Catchment

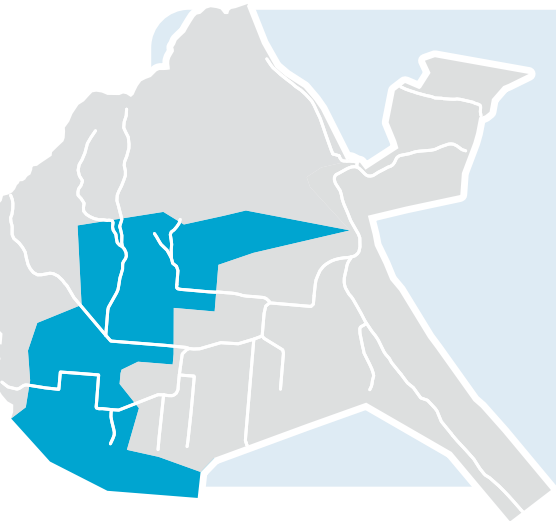
**AREA EXTENT**
**Approx. 5 km²**

**SLOPE**

**LAND USE**
Steep ranges
Whitfield Conservation Area
Low density residential

**DRAINAGE**
Concrete-lined drains
Drainage pipes
Natural channels

**KEY ISSUES** Flash flooding | Extreme heat | Stormwater drainage



### Middle Catchment

**AREA EXTENT**
**Approx. 3 km²**

**SLOPE**
**Steep** (transitioning to moderate)

**LAND USE**
Botanic Gardens, Parks
Residential area, Schools

**DRAINAGE**
Highly modified drains and channels, some concrete-lined and some natural

**KEY ISSUES** Flash flooding | Extreme heat (particularly in areas with little tree cover) | Pooling of stormwater

### Lower Catchment

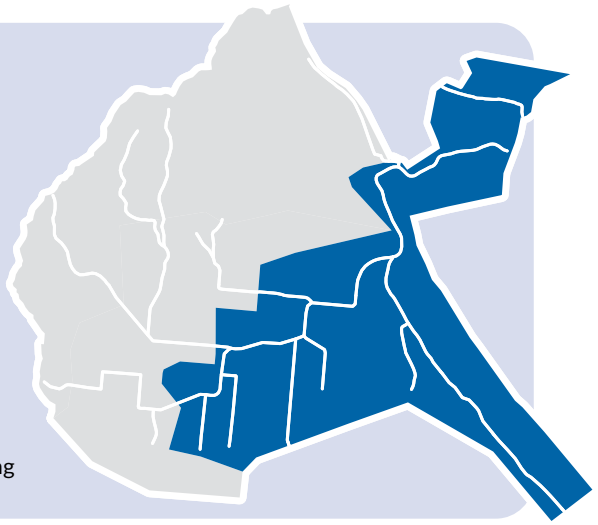
**AREA EXTENT**
**Approx. 6 km²**

**SLOPE**
**Low** (flat terrain)

**LAND USE**
Mixed-use
Residential
Parks Open spaces

**DRAINAGE**
Mix of modified (e.g. Lily Creek) and natural channels.

**KEY ISSUES** Pest management (invasive species) | Extended stormwater ponding/Flooding | Saltwater Intrusion | Litter/Illegal dumping



# Environment and Ecology

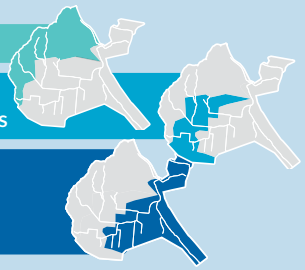
## Creek Lengths

**LILY CREEK**
length ~3km

**SALTWATER CREEK**
length ~9km

**HAMLIFFE CREEK**
length 1.3km

## Seasonal water quality trends



**UPPER:** Nutrient rich

**MIDDLE:** Variable water quality, stormwater inputs, floodwater inputs

**LOWER:** Elevated turbidity, sediment resuspension from tidal action and stormwater inflows

### Dry Season

Increased enterococci (infectious bacteria), limited flow, stagnant water

### Wet Season

Increased stormwater flow, increased turbidity and sediment and nutrients

# Liveable and Resilient Communities

## Urban Form

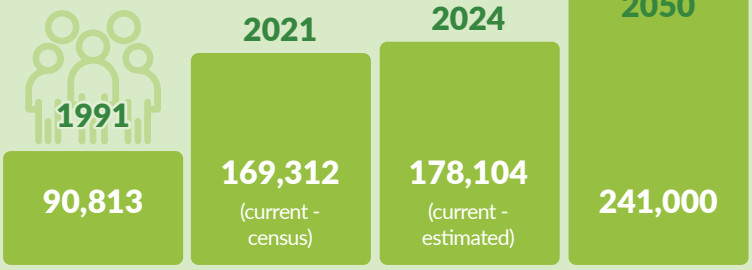
**44**
**Parks and open space**

**Pedestrians and bike paths**

### LAND USE

Residential
Commercial and retail
Green space
Community facilities (Botanic Gardens, Centenary Lakes, Sporting Fields, Tanks Art Centre)
Schools

## Cairns Population




## Catchment Population

**25,000** Estimated catchment population

*(Notes this is an approximated number based on ABS ERP 2024)*

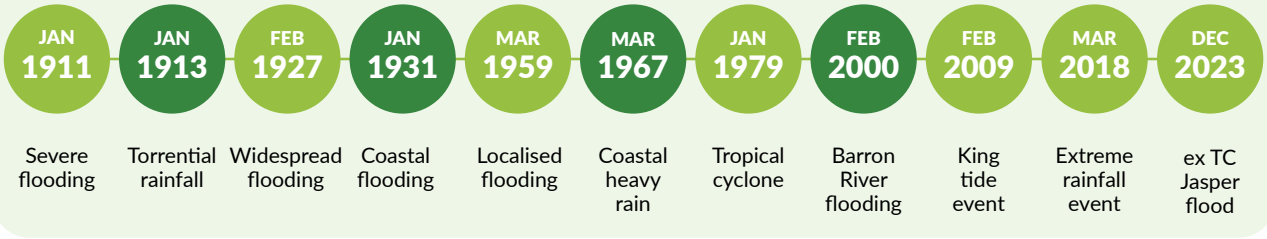
**PERCENTAGE OF ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLES**

**18%** of catchment population

**23%** in Manoora *(highest proportion of any Cairns suburb)*

**9%** of Cairns LGA

## History of flooding



# Water Quality Results Conceptual Model

In the upper catchment, initial water quality sampling by the Gimuy Walubara Yidindji Rangers indicated that there were water quality issues because of urban runoff. Results from middle catchment indicated that water quality was more strongly influenced by stormwater and floodwater inputs, while lower catchment areas demonstrated strong influence by tidal action and stormwater inflows, with some impacts from wastewater overflows.

1. **Nutrient and microbial concentrations are tied to land-use and local pollution sources** (especially under low flow conditions), while rainfall events drive sediment transport towards lower catchment and estuarine areas.

2. **One upstream sampling site is anomalous**, isolated from primary nutrient gradients, suggesting influence by isolated inflow or localised anthropogenic source.

3. **Enterococci levels are elevated at some sites** during the dry season and others during the wet season, indicating possible surface contamination.

4. **Midstream areas exhibit variable water quality conditions**, likely from stormwater/ floodwater inputs.

5. **Upstream of Lily Creek has very low dissolved oxygen**, and other variables are consistently low. The downstream site is similar to other estuarine sites.

6. **Saltwater and Freshwater Lakes show evidence of eutrophication** at times during the year.

7. **Turbidity generally higher near the mouth** probably due to resuspension by tidal movement. In the Wet season rainfall mobilises sediments and nutrients, increasing turbidity, TSS and pH at downstream sites.

Jungle Perch (Kuhlia Rupestris)

## Traditional Custodians-led Catchment Management Plan - Gimuy Walubarra Yidinji

The Gimuy Walubara Yidinji people, have long maintained a deep connection to their ancestral lands and waterways including Saltwater Creek.

In recent years, they have taken a leading role in restoring and managing the health of the catchment, working alongside partners such as James Cook University (JCU), Cairns Regional Council, Yirrganydji Land and Sea Rangers, and Ozfish.

A major focus of their work has been improving flood resilience within the catchment. Recognising the increasing threats posed by climate change, the Gimuy Walubara Yidinji have collaborated with JCU researchers and local government to develop hydrological models that assess flood risks under different climate scenarios. By combining scientific data with TEK and historical records, they have been able to build a more accurate and holistic understanding of how water moves through the landscape, informing better flood mitigation strategies.

Beyond technical research, the project has also prioritised cultural integration and community engagement. Elders and knowledge holders have contributed to decision-making, ensuring that traditional perspectives are embedded in land and water management practices. At the same time, Ranger training programs have provided younger generations with hands-on experience in flow measurement, water quality sampling, and environmental monitoring. These programs not only equip community members with valuable skills but also reinforce their role as custodians of Country. The Rangers have undertaken a year long water quality monitoring program in the catchment which has helped to identify areas of management concern.

The Gimuy Walubara Yidinji have developed a series of seven guiding principles for resilience throughout Gimuy (Cairns). These are:

- Tribal Law and Traditional Ecological Knowledge as the Foundation
- Cultural and Ecological Connectivity
- Community Leadership and Governance
- Water is Life – Prioritising Cultural Flows
- Climate Adaptation Rooted in Cultural Knowledge
- Integration of Traditional Ecological Knowledge with Science for Stronger Outcomes
- Economic and Social Resilience Through Cultural Enterprise.

Through their leadership in this project, the Gimuy Walubara Yidinji are helping to blend tradition with innovation, ensuring that Saltwater Creek remains a thriving ecosystem for future generations.

CASE STUDY

## Policy context

The Master Plan is an important part of Council's long-term planning and strategic framework. It aligns with other key Council strategies and plans to deliver a strong and resilient economy, community and environment.

### Australian Government Legislation, Policies and Strategies

- Environmental Protection and Biodiversity Conservation Act 1999
- Great Barrier Reef Marine Park Act 1975

### Queensland State Government

- Environmental Protection Act 1994
- Coastal Protection and Management Act 1995
- Nature Conservation Act 1992
- Vegetation Management Act 1992
- Reef 2050 Water Quality Improvement Plan
- Reef 2050 Long Term Sustainability Plan
- Biosecurity Act 2014

### Regional Strategies

- Far North Queensland Regional Plan 2009-2031

**Saltwater Creek Catchment**
RESILIENCE MASTERPLAN

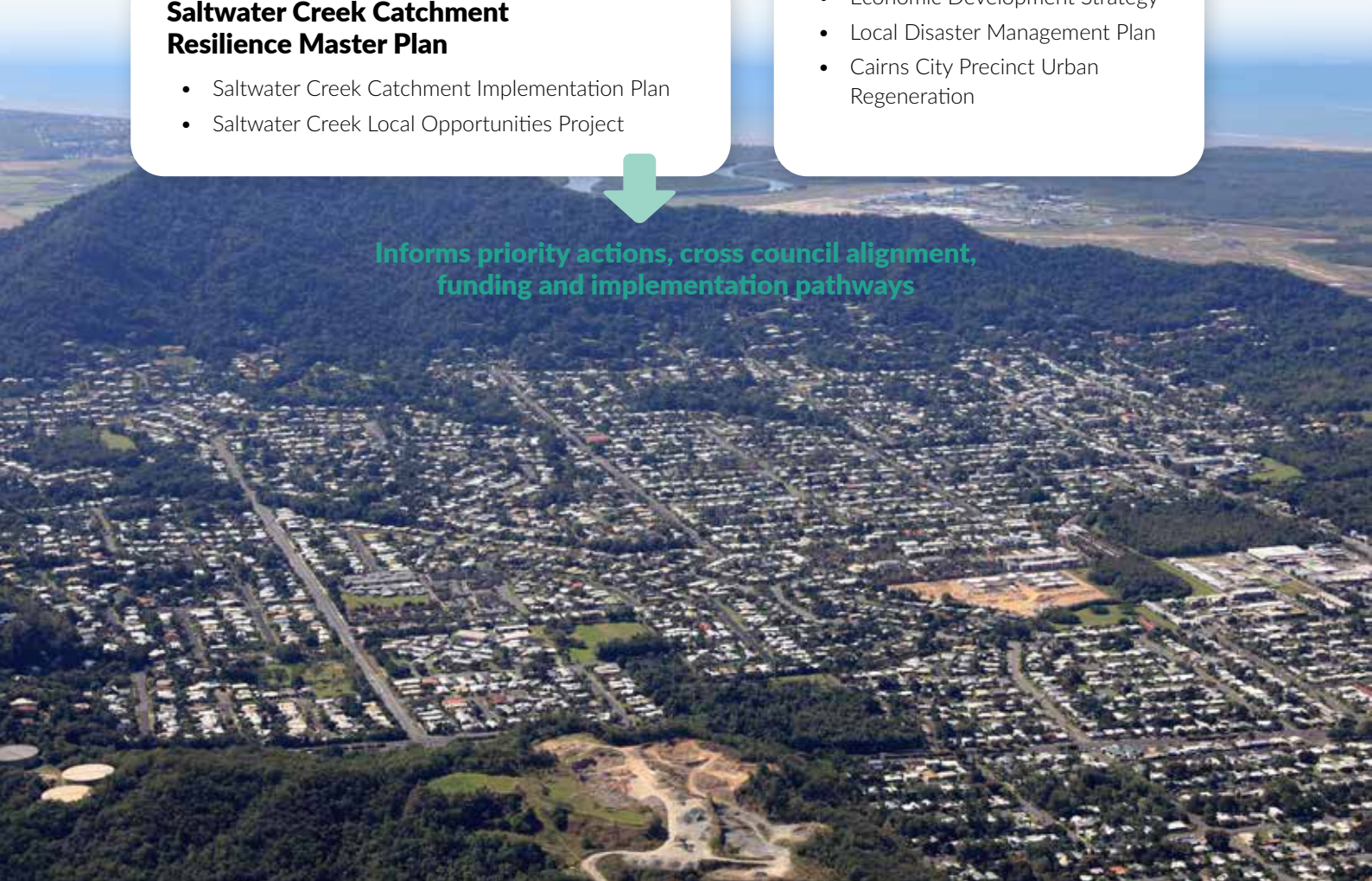
### Council Strategies and Plan

- Corporate Plan 2025-2030
- CairnsPlan 2016
- Towards 2050 Growth Strategy
- Cairns Climate Change Strategy 2030
- Our Cairns Coast 2100
- Reef Action Plan 2025-2028
- Economic Development Strategy
- Local Disaster Management Plan
- Cairns City Precinct Urban Regeneration

### Saltwater Creek Catchment Resilience Master Plan

- Saltwater Creek Catchment Implementation Plan
- Saltwater Creek Local Opportunities Project

**Informs priority actions, cross council alignment, funding and implementation pathways**



## Restoring the habitat and biodiversity at the mouth of Saltwater Creek: A Collaborative Effort

OzFish Unlimited is leading an important environmental restoration project around the lower catchment and mouth of Saltwater Creek.

The project is supported by Cairns Airport, Terrain NRM, the Yirrganydji Land and Sea Rangers, and researchers from James Cook University. This initiative is focused on restoring the hydrology of the mangrove wetlands, a vital ecosystem that provides critical habitat for marine and coastal species. By improving water flow and reconnecting fish habitats, the project aims to support the long-term health of both the creek and the surrounding environment.

To date, significant progress has been made in assessing the state of the wetlands and identifying barriers that restrict water movement and fish passage. Environmental surveys, including fish population assessments, have provided critical baseline data that will inform ongoing restoration efforts. These findings have allowed the team to develop a targeted approach to improving hydrological connectivity, ensuring that the mangrove wetlands can function as healthy and productive ecosystems.

Beyond ecological restoration, the initiative is also fostering stronger community partnerships. This collaboration demonstrates the power of bringing together industry, science, and traditional knowledge to drive meaningful environmental change. Saltwater Creek will be affected by climate change and associated sea-level rise. Work done at the bottom of the catchment will ensure that the creek is more resilient to future shocks and is able to adapt and flourish into the future.

CASE STUDY

# Approach

The Master Plan has been developed in close collaboration with people who live and work in the catchment, as well as through extensive review of existing plans, studies, engagement and technical reports and environmental monitoring data (where available). The process for developing the Master Plan is outlined on p16.

## Consultation and Engagement

The Master Plan was shaped by internal and external stakeholders including JCU academics, CAFNEC, OzFish Unlimited, Traditional Owner groups (Gimuy Walubara Yidinji, Yirganydji), community groups, organisations and community members who have undertaken projects and activities or have previously been involved in Council-led workshops and landscape walks in the Saltwater Creek catchment since 2018.

The first series of workshops aimed to develop a shared vision and guiding principles in consultation with community and Council stakeholders for the catchment, alongside identifying key actions that could be implemented across the area.

The second set of workshops further explored the current challenges and identified future actions needed to address these issues. These workshops also focused on testing the draft Master Plan with divisional Councillors and staff, gathering input to refine the proposed strategic direction and actions and ensure alignment with community and environmental aspirations.

The third stage involved community consultation of the Draft Master Plan. The Draft Master Plan and an online survey to gather community feedback was hosted on the Council's Have Your Say platform. The project team held an information stall at the popular Tanks Markets in Edge Hill. Social media ads to raise awareness of survey targeted residents within the catchment. The public consultation was intented to provide opportunities for the wider community to comment on the Draft Master Plan.

Engagement built on previous consultation in the catchment including the Walking the Landscape project led by Wet Tropics and Terrain and the Saltwater Creek Catchment workshops held at Council in 2021 and land and the sea ranger water quality monitoring program. The engagement process also revisited and incorporated outcomes from past consultation efforts related to other regional planning initiatives such as Towards 2050: Shaping Cairns Growth Strategy, Coastal Hazards Adaptation Strategy (CHAS), Climate Change Strategy 2030, Our Cairns Survey 2024 and Neighbourhood Pathways Program survey. These prior initiatives provided valuable insights and helped to inform the development of the Master Plan, ensuring continuity and alignment with broader community aspirations and regional goals.

Traditional Custodian Groups, including representatives of the Gimuy Walubara Yidinji and Yirrganydji, were integral to the engagement process.

This multi-stakeholder engagement and consultation process helped to create a shared vision for the SWCC, grounded in both local knowledge and environmental expertise, and ensured that the final Master Plan reflects the aspirations and needs of the community, Traditional Custodians, and other stakeholders.

## Master Planning Development Process

### 1 LAUNCH

Saltwater Creek Master Planning Process

- Undertook literature review
- Reviewed other existing plans, and plans being developed in unison

### 2 WORKSHOP

- Two days of walking the catchment was undertaken with project stakeholders including Council's technical and maintenance staff, JCU academics, OzFish Unlimited, CAFNEC, Terrain NRM
- Workshops with Traditional Owner Groups

### 3 DEVELOP

Developed a vision and resilience principles

- Collected and synthesised workshops and walking tour information
- Preliminary mapping of catchment properties and potential actions were noted

### 4 PLANNING

Begin Master Planning

- Tested opportunities and challenges with project stakeholders
- Developed draft Master Plans and refined key actions (online survey and public engagement)

### 5 FINALISE

Finalised Master Plan and Local Adaptation Implementation Plan

- Master Plan released
- Implementation of priority action

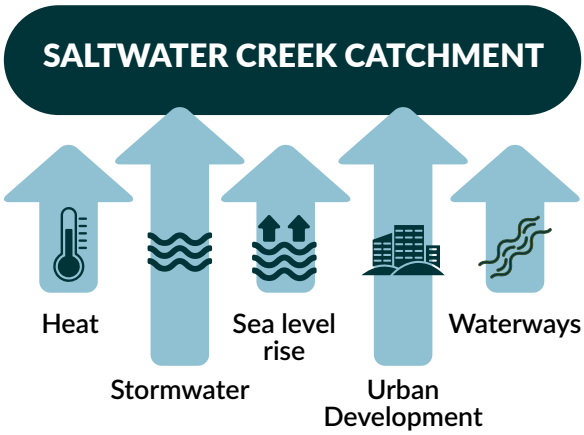
# Strategic Issues

*What are they and why are they important?*

The strategic issues facing the SWCC are primarily driven by the legacy of development on reclaimed wetlands and sand ridges, compounded by pressures from climate change such as coastal hazards, sea level rise, and urban heat.

Urban development exerts pressure through land use changes, infrastructure, stormwater runoff, and habitat modification, which threaten the ecological health of waterways, water quality, and biodiversity, while also impacting cultural values.

Recognising the diverse perceptions of the catchment's value, from cultural and ecological significance to economic and recreational importance, is crucial for managing competing interests and ensuring resilient, sustainable development. Addressing these issues requires integrated strategies that balance ecological preservation, cultural heritage, and urban growth amid increasing climate-related risks.




**Pressures impacting the catchment**

## Different Perceptions of Catchment "Value"

SWCC is valued in different ways by several diverse community groups.

For the Gimuy Walubara Yidinji and Yirrganydji peoples, the catchment provides crucial ecosystem services and is deeply significant in terms of cultural heritage, intergenerational knowledge, lived experience on country, spirituality, and traditional practices.

Local residents value the catchment primarily for its natural beauty, as urban nature, recreational opportunities (e.g. fishing, bird watching etc.), and role in supporting local wildlife, while environmental groups value the catchment in terms of its biodiversity and ecosystem integrity.

Due to its location in a heavily urbanised area, urban developers and businesses are more likely to value the economic growth opportunities presented by the catchment, as well as its role in stormwater management (i.e. allowing stormwater runoff to flow to the ocean). This view is reinforced by historical creek modification and concrete channelling to serve this purpose.

Differing perceptions of value introduce complexities in managing the land and its resources, particularly where issues such as flood mitigation, land use, and conservation intersect. Effective management of the SWCC involves establishing a balance between ecological preservation, maintenance of cultural values and progression of urban development in a way that prioritises collaboration and is resilient to stressors.

## Soil Health, Vegetation Cover and Biodiversity

Overarching catchment health is closely tied to soil health, vegetation cover and biodiversity. These elements are part of a key feedback loop which provide crucial regulating ecosystem services to the surrounding environment. For example, healthy soil provides carbon and water regulation, enhances microbial activity and supports plant growth. In turn, increased vegetation cover contributes to erosion control, helps regulate microclimates and provides wildlife habitat. Both healthy soil and vegetation cover support and are enhanced by biodiversity. Human activities (e.g. urban expansion) in the SWCC are contributing to the degradation of these key elements.

## Water Quality

Water quality in the SWCC is highly variable and influenced by land use, stormwater management, and seasonal conditions. The upper catchment, including urbanised areas near Mount Whitfield, shows elevated nutrients and enterococci during dry periods, likely from stormwater runoff and stagnant flows. Midstream areas experience fluctuating conditions due to urban drainage and floodwater inputs, with some sites affected by localised pollution sources. In the lower catchment, including Lily Creek and Hamliffe Creek, wet season flows cause sediment resuspension, increasing turbidity and Total Suspended Soils.

These pollutants—sediments, nutrients, pathogens—impact aquatic health, contributing to algal blooms, reduced light, and coral stress in the Great Barrier Reef lagoon. Poor stormwater and land-use practices in one part of the catchment influence downstream conditions, highlighting the need for coordinated, whole-of-catchment management.

Flooding in Edge Hill

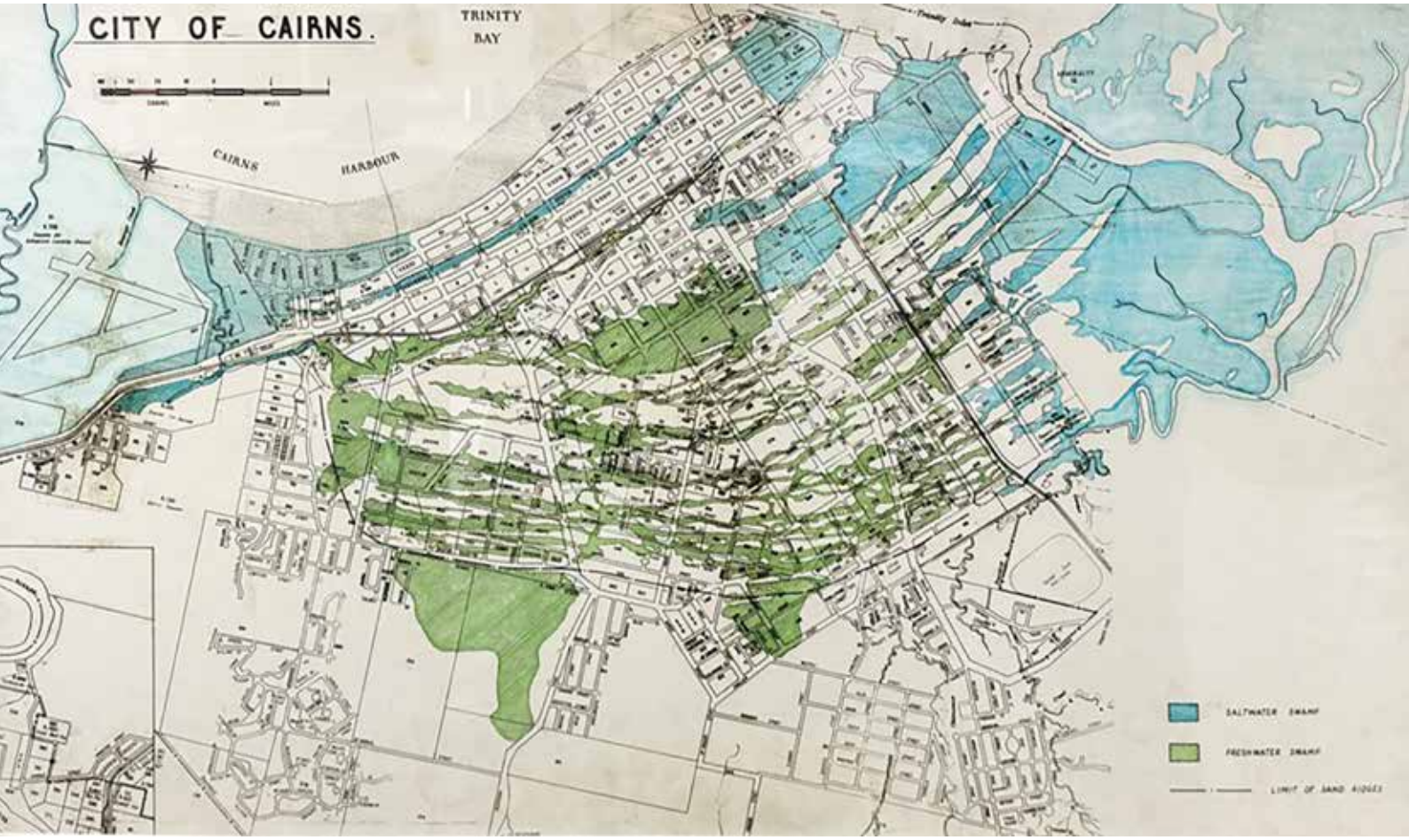
## Impacts of Climate Change

The impacts of climate change will become a key issue for the SWCC in coming years. Rising temperatures will likely exacerbate the urban heat island effect, further reducing the health of aquatic ecosystems and intensifying the impacts of heat stress on human populations, local wildlife and vegetation. More frequent and severe rainfall events will increase stormwater runoff, increasing the risks of flooding, erosion, sedimentation and water quality degradation. Finally, rising sea levels will contribute to saltwater intrusion, threatening freshwater species and habitats further upstream. When combined with more intense rainfall events and coastal hazards such as storm surges and king tides, these changes can overwhelm the catchment's flood management systems, leading to adverse impacts. Adapting to, and building resilience against climate change impacts is therefore critical for the SWCC.

**In the future, the Far North Queensland region can expect:**

*QLD Gov FNQ Climate Change Impact Summary V1, 2019*

- higher temperatures
- hotter and more frequent hot days
- more intense downpours
- less frequent but more intense tropical cyclones
- rising sea level
- more frequent sea-level extremes
- warmer and more acidic seas



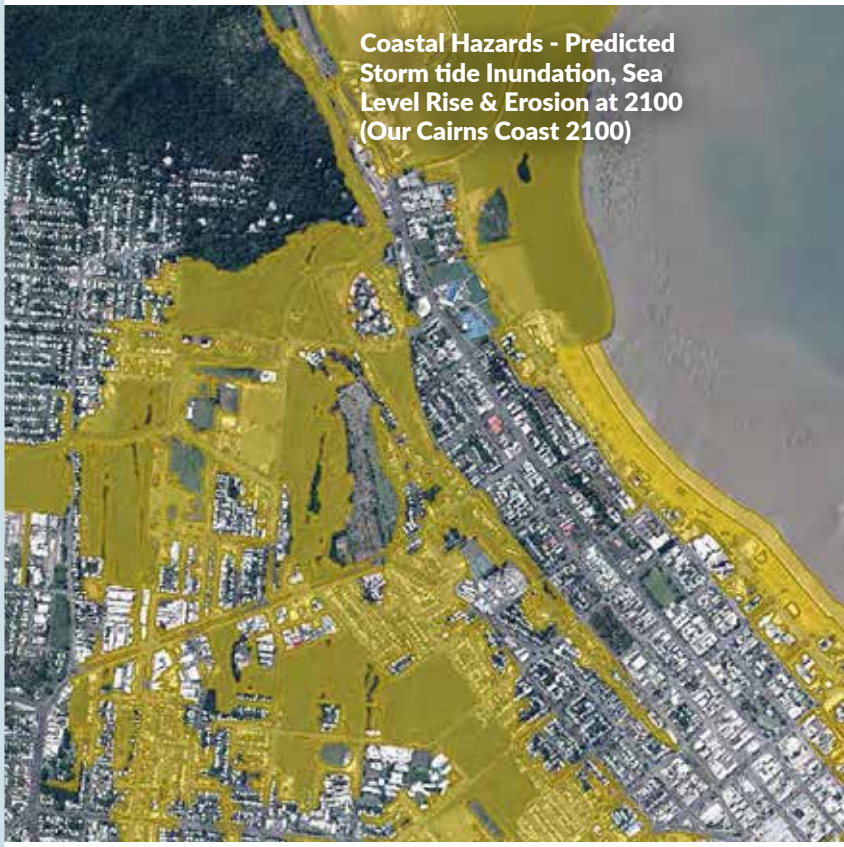

**Cairns City Development Overlying Saltwater and Freshwater Wetlands and Sand Ridges (CRC, Approx. 1952)**

## Coastal Impacts and Sea-Level Rise

SWCC is increasingly vulnerable to the effects of king tides and storm surges as climate change causes sea levels to rise.

These events have already caused flooding and overtopping of the banks in locations like Lily Creek and Hamliffe Creek (Aeroglen), disrupting the use of adjacent footpaths and bike paths.

King tides and storm surges may also overwhelm the sewer system, resulting in untreated wastewater discharging into nearby watercourses, further degrading water quality and increasing risks to human and wildlife health. Sea-level rise exacerbates these issues by increasing the frequency and severity of storm surge events, pushing saltwater further upstream. This causes saltwater intrusion into freshwater systems, damaging sensitive ecosystems and further reducing water quality. King tides and storm surges can also exacerbate impacts from flooding events.



**Coastal Hazards - Predicted Storm tide Inundation, Sea Level Rise & Erosion at 2100 (Our Cairns Coast 2100)**

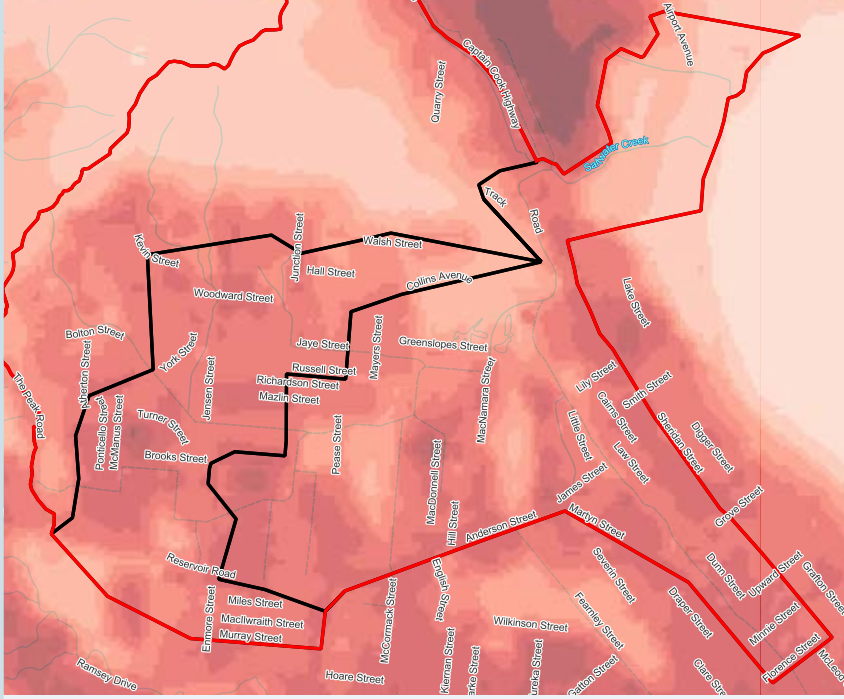
## Urban Development and Urban Heat

Urban growth in the SWCC is putting pressure on the natural environment and making the area less resilient.

As more hard surfaces like roads and buildings are built, trees and green spaces are reduced and less water can soak into the ground, causing more heat to be trapped in urban areas. This creates what is known as the urban heat island effect, where cities become much hotter than nearby natural areas.

The extra heat can warm up local waterways, harming fish and other aquatic life by reducing oxygen levels and changing the balance of ecosystems.

Hotter cities also use more energy and water, putting extra pressure on natural resources. With climate change already bringing more hot days and heatwaves to the region, this problem is expected to get worse. At the same time existing street and shade trees may not be able to tolerate future higher temperatures.



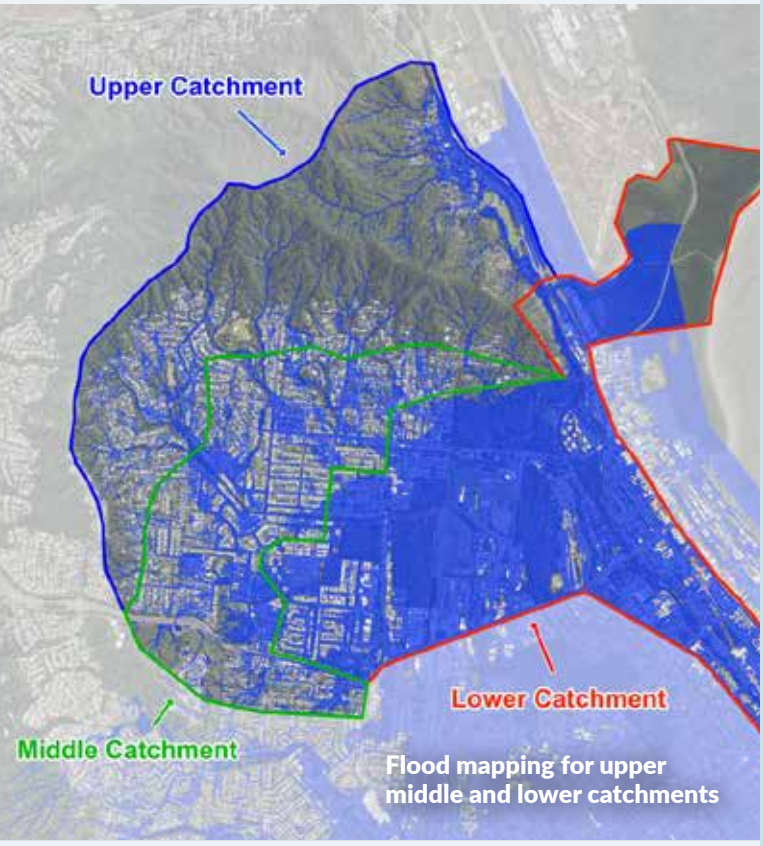

**LEGEND**

- Catchment Boundary
- Sub-Catchments

Land Surface Temperature

- <= 30
- 30 - 33
- 33 - 36
- 36 - 39
- 39 - 42
- 42 - 45
- 45 - 48
- 48 - 51
- 51 - 54
- 54 - 57
- > 57

**Land surface temperature**




**Flood mapping for upper middle and lower catchments**

## Flooding and Flood Management

The catchment is susceptible to flooding and has a long history of flooding events. Flooding in the SWCC area is a significant environmental and community concern, particularly given the close integration of urban and natural landscapes. The catchment frequently experiences heavy rainfall and is often unable to accommodate the natural flow of stormwater into the Great Barrier Reef Basin. Instead, pooling and overtopping of floodwaters occurs in the middle and lower reaches of the catchment. Increasing urban development pressures and climate change impacts place further stress on the system by altering natural flow paths, increasing impervious surfaces reducing infiltration and increasing runoff and altering the intensity of rainfall events.

Flooding impacts all dimensions of the catchment, from the built environment (infrastructure and asset damage) to natural habitats (soil erosion, water quality degradation, disruptions to wildlife etc.), cultural health (restricted access for Traditional Custodians) and community wellbeing.

# Catchment-wide Opportunities

The master planning process identified opportunities to build community and ecosystem resilience, while honouring connections to Traditional Custodians, that could be implemented across the entire catchment area as outlined below.

Hard engineering solutions (such as those required to enhance flood management infrastructure) can be strategically implemented to improve catchment resilience but should not be prioritised due to the high risk of 'maladaptation'.*

## Improve flood control and resilience

Sustainable urban drainage systems (SUDS) and WSUD, (e.g. green roofs, water tanks, urban wetlands and permeable pavements), aim to mitigate flood risks by enhancing water absorption, reducing runoff, and restoring natural hydrological processes. Other innovative flood control measures include the better incorporation of TEK and practices into modern flood management, urban greening practices and raising community awareness. Finally, improving early warning systems and emergency response plans, and installing monitoring systems can reduce flood risks to the community. A collaborative, whole of systems approach to managing and addressing flooding and coastal hazard risks within the catchment promotes sharing of expertise, knowledge and resources to address a key issue affecting a broad section of community and environmental assets.

Climate change will continue to increase flood risks via more intense storms and rising sea levels, however, strengthening flood control measures can help cities (and the broader catchment) remain liveable, sustainable, and safe.

## Support healthy creeks and riparian corridors

Restoration measures, such as reconnecting fragmented habitats, removing or modifying man-made flow barriers to allow aquatic ecosystem movements, stabilising stream banks, eliminating invasive species, and restoring riparian buffers, aim to enhance creek health and stream functions by improving water quality, supporting biodiversity, and fostering a balanced relationship between humans and nature.

## Improve climate resilience and reduce urban heat through urban greening

Heat mitigation measures such as urban greening (e.g. parks, planting native vegetation, tree canopies etc.), expanding green infrastructure (e.g. green roofs) and designing cool streetscapes can help regulate temperatures and reduce heat-related health risks. These measures also have the additional benefits of improving air quality, supporting biodiversity and increasing future resilience to climate change.

## Enhance active transport routes

Growing cities typically produce more traffic, leading to increased congestion, higher greenhouse gas emissions, and reduced air quality. Green and blue corridors in the catchment can incorporate active transport routes by introducing dedicated bike lanes, expanding pedestrian walkways, improving intersections for safety, installing bike-sharing stations, enhancing public transport connectivity and adding green corridors can mitigate some of these impacts, while also benefiting public health.

* ***Maladaptation*** *refers to climate adaptation measures that unintentionally* ***increase vulnerability*** *or introduce new risks—whether through ecological harm, social inequities, elevated greenhouse gas emissions, or future inflexibility.*

## Enhance community and recreational benefits

These actions aim to create spaces that foster community well-being, promote outdoor activities, and increase resilience to environmental stressors. Examples include developing green spaces and parks, improving floodplain management for recreation, creating urban waterways and multifunctional facilities for stormwater management, support recreational fishing opportunities for families and young people, and enhancing walking and cycling networks.

## Encourage community resilience

Communities directly influence catchment health and functions. By empowering local communities through education, skills development (e.g. training on flood preparedness), and opportunities for active stewardship (e.g. inclusion in local water management projects), we can build greater resilience to flooding and ensure long-term sustainability of the catchment. These efforts can also be supported by fostering collaboration between stakeholders and promoting awareness of sustainable practices.

## Honour expertise and connection of Traditional Custodians to Country

Supporting and honouring the connection of Traditional Custodians to their country promotes the integration of Indigenous knowledge, cultural practices, and stewardship into urban development and environmental management practices. Example actions to progress this could include the incorporation of traditional practices into land management, the preservation of culturally significant sites, active engagement of Traditional Custodians in decision-making, planning and project delivery, and the celebration of Indigenous heritage through public art, signage, and cultural events.

## Support cultural and green economies

Cultural and green economies promote the integration of sustainable economic growth with environmental and cultural values to create a resilient, thriving, and inclusive catchment. Encouraging local communities to engage in environmentally sustainable practices while preserving and promoting cultural heritage is key to the development of these economies. Other initiatives include supporting green industries, such as cultural and environmental tours, and events.

CASE STUDY

## OzFish Cairns: Protecting and Restoring Our Waterways

OzFish is currently undertaking vital habitat restoration in the Saltwater, Lily Creek and Hamliffe Creek catchments funded by the Commonwealth Government.

In collaboration with local recreational fishers, the Cairns Regional Council, Traditional Owners (Gimuy Walubara Yidinji, and Yirrganydji), and other community partners, they are working to restore riparian and wetland habitats and improve fish migration pathways (e.g. through the removal of barriers to fish movement or creation of fish passages). The initiative aims to create a thriving, resilient ecosystem that benefits both aquatic biodiversity and the wider community.

OzFish is committed to long-term efforts to maintain healthy, diverse waterways and will continue to seek opportunities for partnerships and conservation initiatives. Working together will ensure that the local fish populations and aquatic environments flourish for generations to come.

# Sub-catchments

## The catchment can be considered through a place based approach with three distinct focus areas (Upper, Middle and low) each with differing issues and risks and actions required to address their unique challenges.

This approach allows for greater community engagement, ensuring local voices shape multiple initiatives simultaneously. By coordinating efforts, it leverages economies of scale, reducing costs and streamlining resources. The cumulative impact of multiple projects delivered together enhances environmental, social, and economic outcomes, creating more visible and lasting benefits. A structured framework for monitoring, review, and feedback ensures adaptability, allowing lessons learned to refine future actions and continuously improve outcomes for the catchment.

To maximise the effectiveness of the Saltwater Creek Masterplan, a place-based approach will be applied across a variety of locations, ensuring targeted actions address the unique challenges and opportunities within the upper, middle, and lower catchment. By implementing multiple projects in each location, we can enhance community engagement, achieve economies of scale, and generate cumulative benefits.

## Upper Catchment

This area, near the foothills of Mount Whitfield, plays a crucial role in water quality and flood management.

As the starting point of the catchment, it influences the volume and quality of water flowing downstream, helping to regulate flood peaks and reduce sediment and pollutant loads. Priorities include vegetation restoration, erosion control, and stormwater management initiatives to reduce sediment and pollutant loads entering the creek. Engagement with local residents, landholders, and Traditional Custodians will be key to long-term success.

## Middle Catchment

Flowing through residential and urban areas, this section experiences urban runoff, habitat fragmentation, and heat stress.

Place-based actions will focus on riparian restoration, water-sensitive urban design, and urban greening to improve biodiversity, water quality, and cooling effects. A coordinated approach will also ensure alignment with broader climate adaptation efforts.

## Lower Catchment

As Saltwater Creek nears the coast, it is influenced by tidal flows, sea level rise, and coastal erosion.

Along the way, it receives water from several small tributaries and springs originating in the upper catchment, which shape the creek's overall hydrology. The lower catchment also includes key urban drainage systems such as Lily Creek and Hamliffe Creek, making this area particularly important for integrated water and flood management. Nature-based solutions—such as mangrove restoration, living shorelines, and sediment management—will enhance resilience while protecting key infrastructure and natural habitats. Coordinated action in this area is critical to managing storm surge risks and maintaining ecosystem services in the face of climate change.

**By selecting diverse locations across the catchment, we ensure that actions work holistically, strengthening the creek's health and resilience from source to sea. Regular monitoring, review, and feedback will allow adaptation of strategies over time, ensuring the long-term success of the Masterplan.**

# Sub-catchment resilience strategies

- Improve heat mitigation
- Reduce water velocity
- Upgrade stormwater/wastewater/ drainage infrastructure
- Limit pollution entering waterways
- Implement nature-based solutions and green infrastructure solutions
- Honour connection of Traditional Owners to their Country
- Improve connectivity and shade cover along active transport routes
- Expand urban greening initiatives, tree canopy cover & habitat connectivity
- Increase shade trees in green & recreational spaces
- Develop and implement nature-based solutions along stream and creek lines
- Support ecosystem services, functions and connectivity
- Foster community partnership for management
- Provide opportunities for public education and capacity building

## Upper Catchment

The key challenges faced by the upper sub-catchment are flash flooding, extreme heat (in more urbanised areas), and stormwater drainage (with the system frequently over-run during heavy rainfall periods).

Flood mitigation and stormwater drainage improvement opportunities include enhancing green spaces at key locations, augmenting drainage corridors, managing debris, reducing sediment and improving channel storage. Opportunities for heat mitigation include increasing urban greening, strategic tree planting and shading to provide passive cooling.

## Middle Catchment

Flash flooding, extreme heat (particularly in areas with little tree cover) and stormwater drainage continue to form the key challenges for this sub-catchment.

Increasing tree coverage along active transport corridors, parks, and bus stops, particularly in areas with vulnerable populations, presents an opportunity to significantly reduce heat exposure risks. Flood mitigation and stormwater drainage improvement opportunities include channel augmentation near the steeper upper catchment boundary (to reduce flow velocities and sedimentation) and, utilisation of existing open spaces to slow stormwater and improve biodiversity. Resilience measures such as enhancing habitat connectivity, managing vegetation in drainage corridors, and building community awareness can reduce both heat and flooding risks.

## Lower Catchment

The key challenges faced by the lower sub-catchment are increased invasive species, storm surge inundation, flooding and saltwater intrusion from sea level rise, and extreme heat (particularly among vulnerable groups).

Flooding risks may be reduced via the strategic installation of infrastructure such as flood gates and increased utilisation of vegetated areas/green spaces to slow stormwater runoff. Rehabilitating / improving degraded ecosystems in wetlands and drainage corridors can reduce flooding risks, while also improving water quality, buffering against the impacts of saltwater intrusion, and bolstering native species' resilience against invasive species. Key heat mitigation opportunities include increasing tree coverage and shading along footpaths. Additional resilience-building opportunities include improving fish passage, enhancing saltwater exchange in mangroves, and establishing ecosystem monitoring and awareness raising initiatives through citizen science and educational programs.

# The SWCC Implementation and Adaptation Plan

The Saltwater Creek Implementation and Adaptation Plan is a collation of actions to support the delivery the of SWCC Resilience Master Plan. Actions were identified and collated following a review of the applicable literature, workshops with project stakeholders and from a walking the catchment study tour.

## Healthy Creeks, Wetlands and Riparian Corridors

Saltwater Creek and its tributaries are the lifelines of the catchment, supporting biodiversity, regulating water flows, providing cultural value, and delivering critical ecosystem services. However, many of these systems have been degraded due to urban development, erosion, altered flows, and fragmentation. Rehabilitating creeks, wetlands, and riparian corridors will not only improve habitat quality and water health but also enhance the system's ability to manage flood risks and adapt to climate change. Restoring and reconnecting natural systems also supports the well-being of communities by creating cooler, greener, and safer public spaces.

## Climate Resilience – Urban Heat and Greening

With climate change intensifying, the SWCC is facing more frequent and severe heat events. Urban areas with low vegetation cover are particularly vulnerable, putting community health and wellbeing at risk—especially for vulnerable groups such as children and the elderly. Increasing tree canopy and expanding green infrastructure can significantly reduce the urban heat island effect, while also improving air quality, enhancing biodiversity, and supporting community wellbeing. Greening the catchment not only cools the landscape but creates healthier, more connected places where people and nature thrive together. It is a practical, cost-effective way to adapt to a warming climate.

## Flood and Coastal Hazard Resilience

Flooding, storm tide inundation, and sea level rise pose growing threats to communities, infrastructure, and ecosystems across the SWCC. These hazards are exacerbated by climate change and urban development, particularly in low-lying areas where water has limited pathways to flow. A proactive, integrated approach to flood and coastal hazard resilience is essential to avoid future damage and displacement. By combining updated data, land use planning, infrastructure upgrades, and natural solutions, the catchment can better withstand shocks and recover more effectively. Resilience in this context means protecting lives and livelihoods while also enhancing the natural functions that support them.

## Community Connection and Engagement

Community engagement is fundamental to the long-term success of catchment resilience. People who are connected to their environment are more likely to value, protect, and actively care for it. Building understanding of how the catchment functions—and how it is changing—empowers individuals and communities to respond to challenges such as flooding, heat, and biodiversity loss. Equally, providing safe, accessible green spaces fosters health and wellbeing, while community-led initiatives create social cohesion and local stewardship. A resilient catchment is one where everyone is informed, included, and inspired to be part of the solution.

## Cultural Connections

The SWCC is Country—home to the Gimuy Walubara Yidinji and Yirrganydji peoples for thousands of years. The landscape is alive with meaning, memory, and knowledge, and the health of the catchment is deeply tied to the wellbeing of its Traditional Custodians. Embedding TEK in catchment planning and implementation enriches environmental outcomes and ensures actions are culturally appropriate and respectful. Supporting cultural revitalisation and recognition of place also helps build community understanding, reconciliation, and shared stewardship. Strengthening these connections is vital for healing Country and people.

## Drainage and Infrastructure

Stormwater and drainage infrastructure plays a critical role in managing flood risk, supporting urban development, and protecting water quality. However, ageing or inadequate infrastructure, sediment build-up, and changing rainfall patterns are straining the system. Climate change will only increase this pressure, highlighting the need to future-proof critical assets while integrating nature-based design. Investing in drainage and water-sensitive infrastructure not only enhances flood resilience, but also helps restore natural flow regimes, reduce erosion, and provide co-benefits like habitat creation and urban cooling. Resilient infrastructure is essential to protecting both built and natural environments in a changing climate.

# Local Opportunities

## Centenary Lakes

LOCAL ADAPTATION PLAN AND WETLANDS REMEDIATION

### Overview

Centenary Lakes, a vital wetland ecosystem in Cairns, faces threats from sea-level rise, saltwater intrusion and poor drainage, leading to impacts such as degraded habitat, poor water quality and fish kills. Detailed local adaptation planning and implementation and wetland restoration could help improve the resilience of this area including enhancing the flood storage and flood management role of the wetlands. This project aims to restore the wetlands ecological functions, enhance biodiversity, support cultural connections and improve water quality to the Great Barrier Reef (GBR).

### Timing: >3 years

### Stakeholders

**Lead:** Cairns Regional Council

**Partners:** Queensland Government, Reef 2050 Plan, Reef guardian Councils, NRM and environmental groups, Traditional

### Funding Options*

**Project Scoping:** $200,000 - $300,000 (exl. GST)
**Design Development:** $200,000 - $300,000 (exl. GST)
**Delivery and Implementation:** $4M-$6M (exl. GST)

**Funding source subject to future budget availability and Grant opportunities e.g. Reef 2050, Reef Guardian Councils etc. Project can be staged and delivered over time.*

### Key Issues

**Climate Change & Water Management:** Rising sea levels (saltwater intrusion), flooding, and poor drainage impact habitat health.

**Fish Health:** Fish kills, restricted fish movement due to barriers such as causeways and weirs.

**Pests & Weeds:** Invasive plants (e.g. Singapore Daisy and Guinea Grass) disrupt ecosystems.

**Community health:** Mosquitoes and sandflies population can cause health issues.

**Cultural Heritage:** Need for Indigenous cultural mapping to guide restoration.

### Opportunities

**Climate Adaptation:** Future-proofing wetlands against environmental risks, carbon sequestration through blue-carbon generation.

**Habitat Restoration & Water quality:** Deepening lakes, improving tidal flow, and regenerating salt marsh. Filtering and improving water quality to the GBR.

**Infrastructure & Biodiversity:** Installing fish ladders, enhancing drainage, and increasing riparian vegetation and shade.

**Cultural & Community Benefits:** Strengthening Traditional Owner partnerships, community asset and ecotourism attraction. Support delivery of cultural heritage and recreational opportunities of Saltwater Creek and Lily Creek.

Bush Stone-curlew (Burhinus grallarius) photographed in Centenary Lakes, Cairns on a quiet weekday morning in spring.

# Jensen Street Parklands

RIPARIAN RESTORATION, COMMUNITY ACTIVATION AND HEAT MANAGEMENT

## Overview

Jensen Street Parkland is an underutilised park and open space in the suburb of Manoora. The Saltwater Creek section that runs alongside the park has been modified into natural drainage, with low habitat value, a small part vegetated with mangroves and the rest of the section is devoid of native riparian vegetation. There are opportunities to activate the park and rehabilitate the creeks to a natural state through creek restoration, habitat restoration, water quality improvement and nature-based recreational opportunities. There are also opportunities to strengthen collaboration with Traditional Custodians to foster community engagement and stewardship of the parks and Saltwater Creek.

## Timing: 5 years

## Stakeholders

**Lead:** Cairns Regional Council

**Partners:** Queensland Government, Reef 2050 Plan, Reef Guardian Councils, NRM and Environmental Groups, Traditional Custodians, Community Groups, residents and schools.

## Funding Options*

**Project Scoping:** $100,000 - $150,000 (exl. GST)
**Design Development:** $150,000-$200,000 (exl. GST)
**Delivery and Implementation:** $2M-$3M (exl. GST)

**Funding source subject to future budget availability and Grant opportunities e.g. Reef 2050, Reef Guardian Councils etc. Project can be staged and delivered over time.*

## Key Issues

**Climate Change & Water Management:** Rising sea levels (saltwater intrusion), flooding, and poor drainage and water quality impact habitat health.

**Fish Health:** Fish kills, lack of fish refuges, restricted fish movement due to barriers such as causeways and weirs.

**Weeds:** Invasive plants disrupt ecosystem's function.

**Community health:** mosquitoes and sandflies over population causing community health concerns.

## Opportunities

**Climate Adaptation:** Flood resilience through channel deepening/widening, improving the soil water absorption within the parkland, urban greening and increasing canopy cover to mitigate increasing urban heat impacts.

**Habitat Restoration & Water quality:** Riparian restoration, habitat rehabilitation and creek widening and naturalisation. Investigate sewerage pump stations and review water quality indicators to design improvements.

**Infrastructure & Biodiversity:** Fish micro habitat, fish passage and movement through leaky weirs, fish ladders, and increasing riparian vegetation and shade, active transport and pathway connections, improve safety, consider adding nature elements to playground.

**Cultural & Community Benefits:** Strengthening Traditional Custodian partnerships, incorporating interpretation and stories into spaces, community greening and activation of parklands e.g. nature playground and outdoor nature classroom, community gardens.

# Catchment Water Quality Improvement

STORMWATER INFLOW AND INFILTRATION MANAGEMENT

## Overview

Within the Saltwater Creek catchment, the risk of inflow and infiltration (I/I) is assessed as high, with flows treated at the Northern Wastewater Treatment Plant (NWWTP). Despite extensive relining efforts within sewer catchments, several sub-catchments continue to perform poorly during wet weather, resulting in overflows through Emergency Relief Overflow Structures (EROS).

Industry knowledge suggests that up to 60–70% of I/I in public sewerage systems may originate from private property connection mains. While property owners are responsible for rectifying defects on private connections, there is limited incentive for them to undertake repairs upon Council request.

The project will involve identifying defects on private property and subsequent rectification in a total of 100 locations within high-risk areas serviced by the NWWTP. The aim is to eliminate unwanted inflows of rainwater and stormwater and infiltration of groundwater into the sewerage system.

## Timing: 5 years

## Stakeholders

**Lead:** Cairns Regional Council

**Partners:** Queensland Government, Reef 2050 Plan, Reef Guardian Councils, Community

## Funding Options*

$300,000 – $500,000 (exl. GST)

**Funding source subject to future budget availability and Grant opportunities e.g. Reef 2050, Reef Guardian Councils etc.*

## Key Issues

**Waterway Health:** Degradation due to pollutant inflows resulting from sewer overflows.

**Customer Impact:** Frequent spills in high inflow areas result in a high volume of customer complaints.

## Opportunities

**Water Quality:** Reduce sewage discharge into waterways and maintain compliance with licence conditions issued by the Department of Environment, Tourism, Science and Innovation (DETSI).

**Infrastructure Efficiency:** Lower network pumping and treatment costs at NWWTP, and extended lifespan of existing sewer assets.

**Community Relations:** Reduction in customer complaints with anticipated reduced sewage overflow events.

# Lily Creek – Blue Green Corridor Project

RIPARIAN CORRIDOR, WATER QUALITY IMPROVEMENT, COMMUNITY ACTIVATION AND HEAT MANAGEMENT

## Overview

The Lily Creek corridor is a strategically important green link with opportunities to improve this connectivity corridor to promote active travel by providing a safe, cool, shaded, and walkable link into the city and future city precincts housing activation areas. Lily Creek is a sub-catchment of Saltwater Creek, located just north of the Cairns CBD. It is a tidal waterway that runs south to north, starting at corner of Florence Street and Water Street (along the railway lines) before joining Saltwater Creek at the Botanic Gardens Precinct and then emptying into the Great Barrier Reef Lagoon. It is highly impacted by urban runoff, and in some parts highly modified to carry stormwater away. Despite this, the creek provides important environmental functions including habitat refuges for the local birdlife, fish habitat and urban greening. The creek has been modified significantly in some parts and functions as an urban stormwater infrastructure. An active transport loop along the creek is popular for recreational activities as well as city commuters.

## Timing: 5 years

**Lead:** Cairns Regional Council

**Partners:** Queensland Government, Reef 2050 Plan, Reef Guardian Councils, NRM and Environmental Groups, Traditional Custodians, Community Groups, residents and schools.

**Role of Council:** Project Manager

**Project Scoping:** $150k - $200k (exl. GST)
**Design Development:** $150-$200k (exl. GST)
**Delivery and Implementation:** $3M - $5M (exl. GST)

**Funding source subject to future budget availability and Grant opportunities e.g. Reef 2050, Reef Guardian Councils etc. Project can be staged and delivered over time.*

**City Precincts Lily Creek Streamway Project scope and pricing as per City Precincts Plan.*

**Image shows artist impression of the Lily Creek Blue-green initiative under Urban Precinct Regeneration project.*

## Key Issues

**Climate Change & Water Management:** Rising sea levels (saltwater intrusion), flooding, and poor drainage and water quality degradation.

**Fish Health:** Fish kills, lack of fish refuges, restricted fish movement due to barriers such as causeways and weirs.

**Pests & Weeds:** Invasive plants and introduced fish species can disrupt ecosystem's function.

**Community health:** mosquitoes and sandflies.

**Urbanisation:** urbanisation encroaching on riparian areas, urban runoff (e.g. fertiliser, herbicide, and litter) and loss of cultural heritage.

**Cultural:** significant cultural heritage sites along the creek require restoration and protection from further degradation.

## Opportunities

**Climate Adaptation:** Flood resilience through channel deepening/ widening, improving the soil water absorption, urban greening and increasing canopy cover to mitigate increasing urban heat impacts.

**Habitat Restoration & Water quality:** Opportunity to create significant blue green corridor including riparian restoration and activation. Water quality monitoring and improvements could see the creek return to a thriving habitat and aquatic ecosystem.

**Infrastructure & Biodiversity:** Fish micro habitat, fish passage and movement through leaky weirs, fish ladder, and increasing riparian vegetation and shade, active transport and pathway connections, improve safety.

**Cultural & Community Benefits:** Strengthening Traditional Custodian partnerships, cultural heritage restoration and protection, place making incorporating interpretation and stories into spaces, community greening and revegetation and activation of parklands. This initiative compliments the Lily Creek Stream Way initiative identified in the Cairns City Urban Precinct Project.

# Whole Of Catchment Actions

Some priority whole-of-catchment actions have been included in the table below. A detailed internal implementation plan will be developed as a live document to coordinate and monitor Council's progress towards a resilient SWCC catchment.

CASE STUDY

## Modelling of Water Sensitive Urban Design (WSUD) Technology to Mitigate Flooding Problems in Wet Tropical Catchment in FNQ (Saltwater Creek Catchment).

A study looking into the capacity of Water Sensitive Urban Design measures to mitigate flooding risks in a tropical catchment was undertaken by a JCU PhD student.

The study was made possible through a collaboration between the College of Science and Engineering - James Cook University (JCU), the Fenner School of Environment and Society - Australian National University (ANU), Cairns Regional Council and the Queensland State Government. The study modelled the flood mitigation capacity of various WSUD measures including bioretention, rain garden, infiltration trench, porous pavement, rain barrel, tree box filter at a whole of catchment scale and at a specific locality - Engineers Parks. Modelling of implementation of WSUD measures at Engineers Parks shows some positive reduction in runoff reduction going into existing infrastructure and roadside runoff resulting in reduced flashiness, severity, and inundation in downstream low-lying areas. Most effective WSUD measure for this specific locality was the rainwater barrel (rainwater tanks for residential homes within the catchment). However, modelling of implementation of WSUD measures at catchment scale show minimal flood reduction benefits especially during heavy wet season. The WSUD system applied at whole of catchment scale does not significantly contribute to reducing the hazard level, particularly during a compounding flood hazard event due to combined rainfall, tidal and sea level rise; it did not exhibit any evident attributes to minimise the flooding during such events. Further investigation into the effectiveness of WSUD measure as local level adaptation and flood reduction measures need to be undertaken.

CATEGORY

## Healthy Creeks, Wetlands and Riparian Corridors

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Naturalise creeks, restore wetlands, and rehabilitate riparian habitat** | Review concrete drains to consider options for rewilding (e.g. hybrid hard and soft options).<br>Review parks with concrete drains to consider re-naturalisation of these to slow and soak water and provide nature positive outcomes.<br>Assess options for wetland development, deepening water bodies, tidal flow management, and sediment control.<br>Strengthen ecosystem health and resilience through targeted conservation and rehabilitation efforts, mangrove restoration, salt marsh rehabilitation and riparian planting.<br>Identify and address areas of erosion and scouring and focus on banks stabilisation and erosion control to address sediment and improve water quality. | Medium term | Council, Community Groups, Partners – Traditional Custodians, schools |
| **Improve fish habitats and aquatic ecosystems** | Remove or modify barriers to fish passage.<br>Investigate ways to improve fish habitat and water flow by removing debris, stabilising banks, and enhancing aquatic environments through fish refuge areas, mangrove restoration.<br>Raising awareness on safe use of riparian areas, incorporating Traditional Ecological Knowledge e.g. crocodile habitat, drainage safety etc. | Medium term | Council, Community Groups, Partners – Traditional Custodians, schools |
| **Plan for riparian corridors** | Maintain and increase setbacks from and increase connectivity between riparian corridors through Planning Scheme. | Long Term | Council |
| **Increase and enhance habitat and biodiversity corridors** | Establish and enhance biodiversity corridors that provide natural shading and connectivity to conservation areas. E.g. better linkages between remnant vegetation and parklands. | Medium term | Council, partners e.g. community groups, NRM groups, community |
| **Monitor and enhance water quality** | Monitor and prioritise water quality initiatives through installation of water quality sensor for live data inputs, manual water quality data sampling with community partners.<br>Investigate sewerage pump station overflows and prevent stormwater and tidal infiltration into the sewerage networks. | Medium Term<br>Medium Term | Council, Partners – e.g. community groups, TOs<br>Council |
| **Identify and secure funding** | Investigate and secure funding for water quality monitoring, enhancement and citizen science | Medium – Long Term | Council, partners e.g. Reef Authority, Fed Gov, State Gov, NRM Bodies |

CATEGORY

## Climate Resilience – Urban Heat and Greening

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Heat mitigation – urban greening** | Undertake detailed heat mapping for catchment.<br>Plan to increase canopy cover in line with FNQ Regional Plan targets.<br>Investigate community planting programs.<br>Consider vulnerable areas and populations through improving heat mitigation strategies, prioritising urban greening especially for vulnerable groups like school children and the elderly.<br>Explore feasibility and enhance urban shading and cooling by increasing tree cover along streets, parks, sports fields and footpaths. | Medium Term | Council, tree planting groups, Traditional Custodians,, community. |
| **Heat Resilient Buildings** | Integration of light building colours, light coloured paving, deep planting and landscape policy items to improve shade and heat deflection.<br>Implement Tropical Urbanism Policy for local centres. | Long Term (New Planning Scheme) | Council |

A male Mistletoe bird (Dicaeum hirundinaceum).

CATEGORY

## Improve Flood and Coastal Hazard Resilience

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Implement drainage, flood management and coastal hazard management measures.** | Progress catchment-wide flood mitigation towards budgeted program of mitigation measures in line with Council's ongoing flooding, storm tide inundation, sea level rise and, erosion work with others. | Project | Council |
| **Update flood mapping** | Using new LIDAR mapping and latest climate science to update flood mapping and coastal hazard inundation. | Medium Term | Council |
| **Plan for flood resilience** | Ensure flood and coastal hazard risks are incorporated into future planning to manage and avoid putting future populations at risk.<br>Promote flood resilient housing design through planning scheme guidelines.<br>Amend planning scheme to enforce habitable floor above maximum flood level.<br>Modelling of the effectiveness of measures to mitigate flood risks. | Medium Term | Council |
| **Increase and improve community flood awareness** | Implement flood monitoring and live sensor sites, and interpretive signage to inform community of flooding and storm tide inundation risks. | Medium Term | Council, Community Groups, Partners – Traditional Custodians, schools |
| **Investigate WSUD opportunities in catchment** | Investigate and implement opportunities such as porous paving, rainwater tanks, leaky weirs etc to improve onsite water retention. | Medium-long term | Council |
| **Funding for flood mitigation and resilience** | Investigate and secure funding to implement flood mitigation strategies for coastal and flood hazard adaptation to protect vulnerable areas. | Short – Medium term | Council, partners Fed Govt., State Govt. e.g. Disaster Reduction Funding |
| **Modify waterways** | Explore modifications to waterways and channels to improve flood management and ecosystem resilience.<br>Remove debris and blockages to maintain water flow and reduce flood risks (e.g. litter removal, illegal dumping, manage weeds to reduce spread and reinfestation and to reduce impacts on the habitat. | Long term<br>Short – Medium term | Council<br>Council |

CATEGORY

## Connected communities

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Connected pathways, streets and neighbourhoods within the catchment** | Connect footpaths and bike paths to encourage active travel, utilising green and blue corridors to improve connection to nature.<br><br>Connect neighbourhood centres, parks and school through active and public transport facilities and access. | Medium Term | Council, State Government |

CATEGORY

## Community resilience

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Community resilience and stewardship** | Develop programs and tools and foster networks to promote flood resilience in the community.<br><br>Involve community in catchment activities (e.g. Community plantings, cleanups, riparian restoration).<br><br>Updating and promoting existing education resources including story telling (Living with Water, Disaster in Classroom). | Short-Medium Term | Council, volunteer groups, NGOs, TCs |

CATEGORY

## Cultural Heritage Connections

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Collaborate with TC on catchment management and implementation projects.** | Work with Traditional Custodians to identify opportunities for collaboration and partnerships for waterway rehabilitation, cultural landscape recognition and cultural heritage protection.<br>Work with Traditional Custodians to integrate TEK into future planning, design, ongoing catchment resilience and management.<br>Work with Traditional Custodians to identify opportunities to integrate cultural land management practices for vegetation and fire management.<br>Support Traditional Custodians to identify opportunities for funding and grants to implement their Traditional-led catchment management plan. | Ongoing | Council, Traditional Custodians, Community Groups |
| **Cultural spaces** | Assist with identifying opportunities for cultural base and education sites for Traditional Custodians SWC for learning, community building and tourism.<br>Work with Traditional Custodians to identify, rehabilitate and protect natural springs and places of cultural significance. | Long term | Council, Traditional Custodians, Community Groups |
| **Increase cultural awareness** | Work with Traditional Custodians to develop culturally appropriate education resources on living on country, catchment history and Traditional Ecological Knowledge (e.g. interpretive signage, Indigenous food trails). | Long term/ ongoing | Council, Traditional Custodians, Community Groups |

CATEGORY

## Drainage and Infrastructure

| Objective | Actions | Timing | Partnerships |
|---|---|---|---|
| **Upgrade and provide drainage infrastructure** | Assess feasibility of upgrading drainage infrastructure, widening, enhancing storage capacity and protecting vulnerable properties.<br>Investigate measures to reduce water velocity (e.g. leaky weirs, natural swales).<br>Enhance flood storage capacity of existing parks, ovals and green spaces that are adjacent to watercourses. | Medium - Long term | Council |
| **Implement new infrastructure** | Investigate critical infrastructure (e.g. flood levees, tide gates, bridged culverts) at strategic locations to protect vulnerable areas and reduce flood risks. | Medium - Long term | Council |

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