Townsville and Palm Island Regional Drought Resilience Plan

2024–2030

Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

Queensland Government

Rural Economies
Centre of Excellence

The Townsville and Palm Island Regional Drought Resilience Plan has been developed as a partnership between the Rural Economies Centre of Excellence (RECoE), Townsville City Council and Palm Island Aboriginal Shire Council and the following organisations who will lead implementation of any actions: NQ Dry Tropics, Townsville Enterprise, Townsville Chamber of Commerce, Regional Development Australia (Townsville and North West Queensland), Palm Island Community Company and Selectability.

The Regional Drought Resilience Planning program is jointly funded through the Australian Government's Future Drought Fund and the Queensland Government. Development of the plan has been supported by the Australian Government (Department of Agriculture, Fisheries and Forestry) and the Queensland Government (Department of Primary Industries).

Acknowledgement of Country

We pay our respects to the Aboriginal and Torres Strait Islander ancestors of this land, their spirits and their legacy. The foundations laid by these ancestors – our first Australians – give strength, inspiration and courage to current and future generations, both Indigenous and non-Indigenous, towards creating a better Queensland.

In particular we acknowledge the Wulgurukaba of Gurambilbarra and Yunbenun, Bindal, Gugu Badhun and Nywaigi peoples of the area now known as Townsville and the Manbarra people & Bwgcolman people of the Palm Island area.

We recognise it is our collective efforts and responsibility as individuals, communities and governments to ensure equality, recognition and advancement of Aboriginal and Torres Strait Islander Queenslanders across all aspects of society and everyday life.

On behalf of the Queensland Government, we offer a genuine commitment to fearlessly represent, advocate for, and promote, the needs of Aboriginal and Torres Strait Islander Queenslanders with unwavering determination, passion and persistence.

As we reflect on the past and give hope for the future, we walk together on our shared journey to reconciliation where all Queenslanders are equal.

Contact us

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Interpreter statement

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding the regional drought resilience plan, you can contact us for assistance and we will arrange an interpreter to effectively communicate the plan to you.

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Foreword

The Townsville City Council and Palm Island Aboriginal Shire Council proudly acknowledge Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas, and their rich contribution to our society. We acknowledge the Wulgurukaba of Gurambilbarra and Yunbenun, Bindal, Gugu Badhun and Nywaigi peoples and the Manbarra & Bwgcolman people.

Image: Floodplain, Townsville

Our regional vision

The Townsville and Palm Island region is home to over 200,000 people who live, work and play in a beautiful tropical context along the north Queensland coast that features both wet and dry tropics environs, world heritage areas, the Great Barrier Reef and a thriving city.

The region is no stranger to natural disasters and hardship – cyclones, floods, droughts and economic downturns are regular events and have created a resilient and adaptable culture, one that recovers from local events and supports the wider north Queensland in its time of need. The region's leaders acknowledge the changes occurring in the climate and the potential for longer and hotter dry seasons and steeper and deeper wet seasons and the need to proactively nurture resilience to drought economically, socially, and environmentally.

While the two local government areas have very different demographic profiles, soft and hard infrastructure, economic opportunities, history and culture – they have worked together to build regional resilience through stakeholder engagement and informed planning.

The potential of the region is enormous and inspiring, with a shared vision for a future where the region is proud of its first nations culture, vibrant economy, strong and resilient community, and stunning natural landscapes.

As project leads, Palm Island Aboriginal Shire Council and Townsville City Council are committed to working collaboratively across the various tiers of government and with industry and community partners, in the development and implementation of this Regional Drought Resilience Plan.

Through whole of region initiatives and locally focused actions, we will build local capacity and resilience, continuing to grow and thrive.

The Townsville and Palm Island Drought Resilience Plan 2024–2030 has been developed in accordance with the guidelines distributed by the Australian Government's Future Drought Fund (FDF) program. It also has been shaped by the inputs from key stakeholders along with the voices and experiences of the region's people and authoritative research. The plan is owned by the key stakeholders involved in its development and is expected to be of interest to a diverse audience including all levels of government, regional and industry development organisations, disaster management agencies, the environmental sector and community groups – in general, all those impacted by drought.

It provides a profile of the region describing its weather and climate along with socioeconomic data and a summary of the past and potential impacts of drought across social, economic, infrastructure and environmental domains. It is strongly noted these perspectives cannot be taken in isolation – drought impacts a region holistically and an effect in one domain has knock on effects in another.

The region's water supply relies on local dams filled by rainfall. Data provided illustrates trends for increased temperature and decreased rainfall which will impact the demand for water, especially in seasons where the summer rainfall under performs. This supply/demand disparity is further exacerbated by plans for economic diversification and population growth.

A framework for a drought resilience strategy is provided, outlining a series of six key pathways and the associated strategies and actions – derived from the syntheses of community engagement insights and the information gained from the literature review and research, balanced with knowledge and experience in community resilience and disaster management. The identified pathways are:

- Water Security
- Resilient Natural Environment
- Resilient Community
- Resilient Economy
- Resilient Infrastructure
- Regional Drought Governance.

Each of these pathways is expanded with strategies and actions and clarified by the articulation of lead institutions, key partners, and investment targets. A quadruple bottom line impact is demonstrated by identifying the outcomes that will be delivered. The actions are also mapped to the three pillars to prepare for and deal with drought articulated as part of the Drought Resilience, Adaptation and Management Policy (DRAMP) framework[1] and the three objectives from the Queensland Strategy for Disaster Resilience (QSDR) 2022–2027.[2]

The plan also outlines a partnership approach to the realisation of the articulated resilience strategy, noting one organisation won't have the resources and capacity to be individually responsible for the delivery of the plan, and nor should they. Best practice in disaster management dictates community led initiatives are more likely to be successful and resilience is built across contexts. The plan recognises drought is not considered a disaster but the very characteristics keeping it from being classified as such – its regularity and duration – dictate resilience is the key to ongoing survivability and thrivability.

The plan concludes with a detailed monitoring and evaluation strategy to ensure not only do the partners accept responsibility for implementing the plan, but there is a defined process to monitor and assess the progress of its implementation and the impact it is having on its host communities.

Image: Townsville Town Common *Source: Townsville City Council.*

Acronyms

AIHW	Australian Institute of Health and Welfare
BoM	Bureau of Meteorology
CDI	Combined Drought Indicator
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DPI	Department of Primary Industries
DRAMP	Drought Resilience, Adaptation and Management Policy
DSDIP	Department of State Development, Infrastructure and Planning
FDF	Future Drought Fund
LGA	Local Government Area
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
GRP	Gross Regional Product
NQDT	North Queensland Dry Tropics
NQROC	North Queensland Regional Organisation of Councils
NRM	Natural Resource Management
PI	Palm Island
PIASC	Palm Island Aboriginal Shire Council
QFD	Queensland Fire Department
QSDR	Queensland Strategy for Disaster Resilience
QRA	Queensland Reconstruction Authority
RECoE	Rural Economies Centre of Excellence
RDA TNWQ	Regional Development Australia Townsville and North West Queensland
RDRP	Regional Drought Resilience Plan
SEIFA	Socio-Economic Indexes for Areas
TCC	Townsville City Council
TEL	Townsville Enterprise Limited
Tvl	Townsville
UNDRR	United Nations Office for Disaster Risk Reduction
WoR	Whole of Region

Introduction

Background

The Regional Drought Resilience Planning (RDRP) program is jointly funded through the Australian Government's Future Drought Fund and the Queensland Government.

The Queensland Department of Primary Industries (DPI) has partnered with the Rural Economies Centre of Excellence (RECoE) with the purpose to have an impact on how regions can survive and thrive into the future.

The RDRP process will:

- foster learning and build social capital.
- foster co-designed, community-led planning and collective.
- ownership of the resulting plan and its implementation
- leverage existing local, regional, and state strategic planning.
- recognise the diversity of people, businesses and landscapes involved in agricultural production.
- provide linkages with the FDF Drought Resilience Adoption and Innovation Hubs.

Five regions produced RDR plans in the foundational year. In the second round, the remaining nine regions developed RDR plans to prepare for future droughts, with a sharp focus on the agricultural sector and allied industries.

Each plan will build upon the Regional Resilience Strategy as part of the Queensland Government's Strategy for Disaster Resilience, led by the Queensland Reconstruction Authority. Based on evidence and collaboration through partnering with local councils, regional stakeholders and other organisations, the plans – led and owned by the community – aim to drive decisions, actions and investments to proactively manage drought risk.

Regional Drought Resilience Planning

Australia, and particularly the State of Queensland, is no stranger to drought. First Nations traditional stories of drought go back thousands of years and European settlers have officially recorded drought in Australia since the late 1700s. Droughts have been officially 'declared' in Queensland since 1897.[3]

The economic, social and environmental costs of drought in Queensland are immeasurable. The toll taken on regions and their communities is high and the impacts often linger for decades. So, in recent years there has been a growing emphasis on the importance of drought resilience planning. This means planning now for the next drought and considering how to do things better or differently to make our communities more resilient.

Alignment with the Queensland Strategy for Disaster Resilience and Regional Resilience Strategies

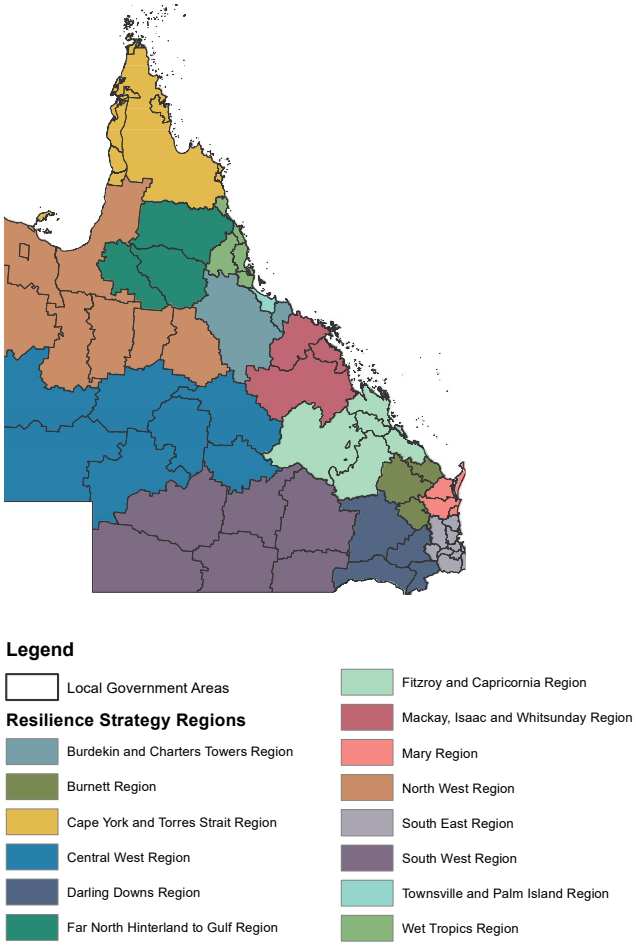
Queensland is the most disaster impacted state in Australia, and Queenslanders are susceptible to a variety of hazards. We are facing unprecedented change in both our current and future operating environment with a dynamic political, social, economic and policy landscape surrounding disaster risk reduction and resilience. This is being amplified by natural hazards becoming more frequent and intense due to a changing climate.

The *Queensland Strategy for Disaster Resilience 2022–2027* (QSDR) promotes a systems approach to resilience that connects with a range of agencies and sectors to deliver improved outcomes for Queensland.

Queensland's suite of Regional Resilience Strategies ensure every region across Queensland is now part of a locally-led, regionally-coordinated and state-facilitated blueprint to strengthen disaster resilience.

It is often agreed that resilience planning for disasters and resilience planning for drought should be aligned. The Queensland RDRP program builds on the work completed under the QSDR, led by the Queensland Reconstruction Authority (QRA). The RDRP program provides the opportunity to have a clear focus on drought risk in the context of regional resilience, addressing the unique challenges it poses and the need for setting out drought-specific priorities and actions at a regional and local level.

Figure 1: Queensland's Regional Resilience Strategies (Regions and Local Government Areas), Queensland Strategy for Disaster Resilience 2022–2027.[13]



Regional planning and engagement

This RDR plan was developed through collaboration between Townsville City Council, Palm Island Aboriginal Shire Council, and key regional stakeholders representing economic, environmental and community groups, and government departments.

The engagement model was developed from earlier work undertaken by RECoE, Red Cross Queensland[4], the Queensland Reconstruction Authority (QRA)[5], CSIRO[6] and was informed by international best practice from the World Bank and the UNDRR[7] . The plan has been reviewed by an independent assessor appointed by the Australian Government, and their feedback has been incorporated in the final plan.

The RDRP engagement process was iterative and involved a systems approach that has enabled community reflection on issues, with combined data paying respect to local, traditional, and scientific knowledge.

The plan was co-designed with local stakeholders, using an approach that emphasised trust-building, building on existing networks, local co-design and commitment, risk-informed processes, place-based and regional strategies, locally-led and coordinated solutions and integrated multi-objective responses.

Townsville and Palm Island regional stakeholders were identified by the research team as those who would have valuable insights into the resilience status and needs of the area economically, environmentally, and psychosocially who had leadership roles and contacts. Some identified stakeholders were familiar with both the local government areas while others were across the issues for either Townsville or Palm Island (not both). The socio-economic disparity between the two LGAs – outlined later in this plan – had a major impact on the selection of those engaged. For example, on Palm Island there is very little private business. The Palm Island Community Corporation and the Council provide commercial services such as the supermarket, motel and café, while Townsville City is the economic powerhouse of North Queensland with major industries.

The identified stakeholders were individually interviewed using a consistent set of questions, customised where appropriate to the context, interviewee, or conversation. During these interviews, recommendations were made to other stakeholders and in most instances, introductions were made for the research team. This provided the second tier of interviews along with follow ups with several of the initial interviewees.

After the interviews and development of the first draft of the regional profile and literature review, all the information was synthesised and tentative conclusions about the resilience needs of the region were made. These draft goals, outcomes and strategies were negotiated at a Regional Forum held in Townsville on 4 October 2023 and further refined prior to finalisation. Further individual stakeholder consultation has occurred during the documentation of this Regional Drought Resilience Plan during which the key components have been tested. The final draft was subject to feedback from the local governments and key stakeholders including Townsville Enterprise (Economic), Dry Tropics Natural Resource Management (Environmental).

The lack of understanding and focus on 'drought' as a personally relevant concept initially created some difficulties in terms of engagement and securing times on the agenda of very busy stakeholders. Although numerous requests were made for consultation with local indigenous traditional owners', access was difficult and with the expectation of remuneration which was contrary to the RDRP research process. This was overcome by the inclusion of input to other plans (including the Multihazards Strategy) and through connections with other partners who have established consultation processes with the indigenous peoples – for example NQ Dry Tropics Indigenous reference groups and projects.

31 individual stakeholders were involved in over 50 consultations, either individually or in small groups.

Table 1: Unique stakeholder engagements – Townsville and Palm Island RDRP.

LGAs	8
Formalised conglomerations of LGAs	0
Farming groups	0
Farming businesses	0
Regional Development Australia Committees	1
Regional NRM organisations	2
Indigenous groups/organisations	1
Agricultural industry representative groups (peak bodies)	0
Development commissions	3
Emergency services	0
Community service organisations	1
Research organisations	0
Water authorities	0
Utility organisations	2
Financial institutions	0
Farm Advisers/Consultants	0
Drought Resilience Adoption and Innovation Hubs	1
* Chambers of Commerce	1
* Agribusinesses	0
* Other businesses	1
* State Government agencies	5
* Federal Government agencies	0
* Other FDF programs	0
* Individual / community member	2
* Governance Groups	0

Key principles and concepts: drought and resilience

While there is no universally accepted definition of drought, in Australia, the Bureau of Meteorology (BoM) states, *"drought, in general, means acute water shortage"*.[8]

In Queensland, drought is 'declared' for a local drought area and/or individual properties. Local drought areas are drought declared *"when the rainfall recorded during the previous 12 months (minimum) is in the lowest (or driest) decile or below the 10th percentile when compared to the long-term historical rainfall"*.[9] This is the technical definition of drought utilised in this plan.

'Resilience' is harder to define. The World Bank has defined resilience as the ability *"…to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner"*.[10]

Australia's CSIRO perhaps more specifically states:

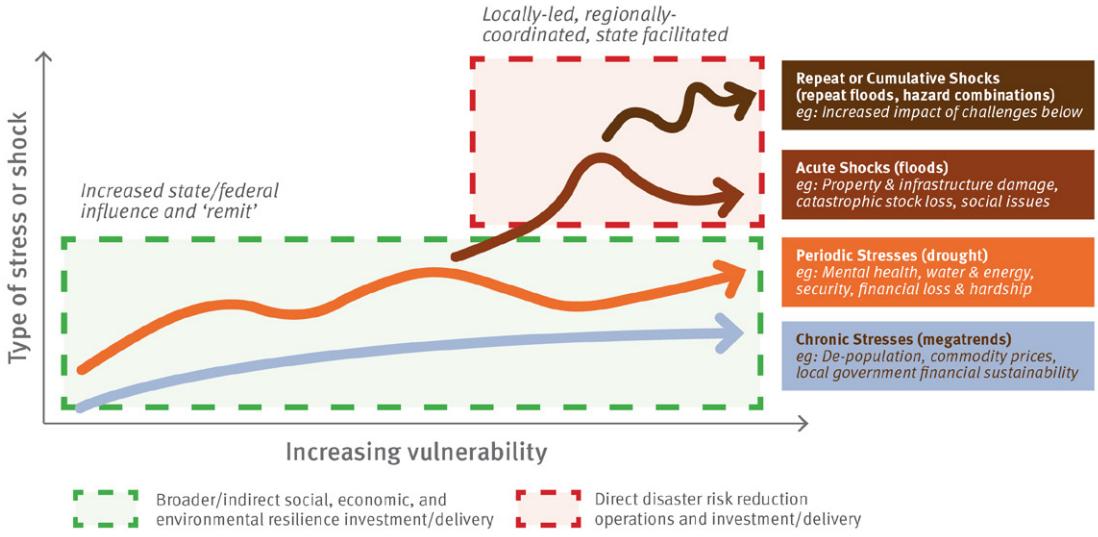
"drought resilience will result in a regional Australia that can endure deeper, longer droughts, and recover from them sooner. This will allow our food and agribusinesses to boost national farm income, increase food security, and protect the regional jobs that rely on agriculture. It will increase the resilience of rural and regional communities that depend on agriculture and improve environmental outcomes".[11]

This plan utilises drought resilience objectives that broadly align with the four key objectives underpinning the Queensland Strategy for Disaster Resilience.

Figure 2: Four key objectives of the Queensland Strategy for Disaster Resilience 2022–2027.[14]

Experience from earlier works on resilience has highlighted the crucial importance of community and regional resilience, sometimes referred to as 'societal' resilience. For instance, work by QRA has revealed that community stakeholders report that their 'societal resilience' is significantly affected by chronic and enduring stresses (long-term megatrends such as ageing populations, fluctuating commodity prices), periodic stresses (such as drought) that are often cyclical, acute shocks (such as rapid-onset disasters), cumulative shocks (often a rapid succession of shocks or the increased impacts of the combined stresses and shocks).

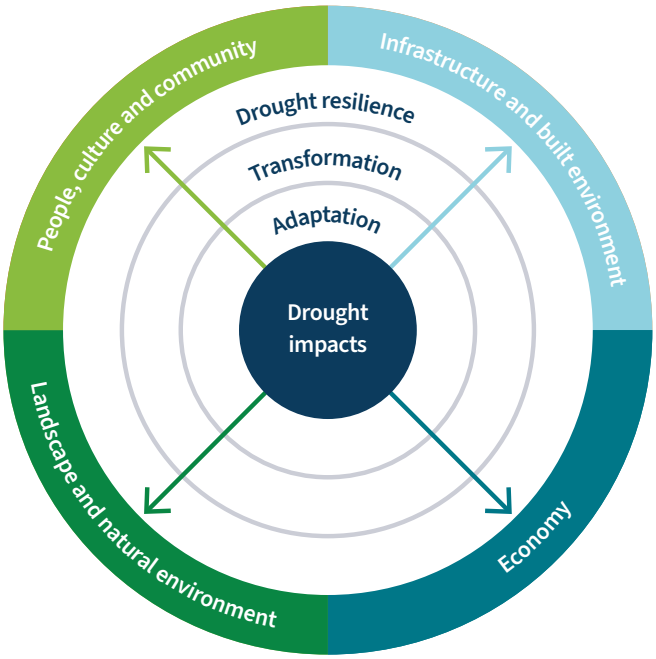
Figure 3: How resilience is affected by stresses and shocks, adapted from the Queensland Strategy for Disaster Resilience 2022–2027.[15]



While drought has been often referred to as "an enduring feature of the Australian landscape", when viewed in this context of community resilience, drought is also understood as a periodic stress that comes and goes. However, it is now evident that the warming caused by climate change has added to the variability in Queensland's weather and "increased the severity of drought conditions during periods of below-average rainfall".[12]

Importantly, our approach and engagement processes encouraged community and regional stakeholders to express their own observations of 'drought' and 'resilience'. We have combined the 'local' with 'outside' definitions to produce the regional understanding that underpins this plan and identifies drought impacts, risks and pathways to resilience.

Figure 4: Queensland RDRP elements of drought resilience.[16]



Stakeholders in tropical areas like Townsville and Palm Island tend view the term 'drought' differently to their counterparts in non-coastal communities like Western Queensland. Tropical Queenslanders often see 'drought' as vast expanses of dry, barren country unable to sustain plant or animal life. Since the completion of the Haughton Pipeline, which has been promoted as the panacea for drought in the Townsville area, there has been even less interest in discussing drought – in particular drought resilience, as there is a perception the area is 'drought proof'.

Townsville residents however are not strangers to the concept of comparatively low rainfall and the experience of extended periods with no rain at all and refer to these instances as 'long drys' or long dry seasons. They are also aware water restrictions are a fact of life, required to manage the level of demand. For these reasons and to counteract an attitude of complacency, the language "extended dry seasons" or "failed wet seasons" was used during the engagement process.

The small community on Palm Island are very conscious of the constraints they face in terms of the limited capacity of the dams on the island, however with very little economic activity the key issue caused by extended dry seasons or failed wet seasons is around potable drinking water and the social impacts of conditions caused by periods of below-average rainfall.

Resilience was explained as being able to prepare for the long dry so it is easier to manage and to have strategies in place to cope should the situation arise.

This terminology was used in the engagement process to enhance the relatability of the concept of drought resilience to the participating stakeholders.

How to use this plan

The purpose of the plan

The Townsville and Palm Island Regional Drought Resilience Plan has been developed in accordance with guidelines distributed by the Australian Government's Future Drought Fund (FDF) program. It also has been shaped by inputs from key stakeholders along with the voices and experiences of the region's people.

The purpose of this RDRP is to:

- Express the outcomes of the RDRP process and the aspirations and commitments of the region's people.
- Identify and establish critical networks and partnerships to inform and support drought resilience planning and actions.
- Combine the best of local and traditional knowledge with best practice data and information to make informed decisions.
- Clearly identify and plan for the ongoing and future impacts of drought across the region.
- Highlight pathways the region can use to adapt to changes and build drought resilience.
- Specify key actions (regional and local) that can be implemented to build drought resilience in the region.

The RDRP process is intended to be practical, implementable, and ongoing. As the region undertakes the specified actions, this plan will assist with monitoring progress and future learning.

Key inputs

This plan draws from and builds upon many important works. Some key plans, projects and studies used to inform the development of this plan include:

- Queensland Strategy for Disaster Resilience 2022–2027
- Townsville and Palm Island Multihazards Resilience Plan
- Townsville City Council Disaster Management Plan – Recovery and Resilience
- Townsville City Council Corporate Plan
- Palm Island Aboriginal Shire Council Disaster Management Plan.
- Palm Island Aboriginal Shore Council Drinking Water Management Plan Report 2021/22
- Townsville Cooperative Research Centre Water Sensitive Papers
- The Regional Drought Resilience Plan for Burdekin and Charters Towers.

In particular, the Townsville and Palm Island Multihazards Resilience Strategy prepared in 2022 as a partnership by the between the Queensland Government through the Queensland Reconstruction Authority, Palm Island Aboriginal Shire Council and Townsville City Council, was a critical resource in ensuring a cohesive and strategic approach to resilience in the region. The Multihazards Resilience Strategy was developed through engagement with a wide range of stakeholders, therefore this Regional Drought Resilience Plan was informed by, and builds upon, the previous document and informing process.

Other important linkages

It is intended this plan is considered and factored into a range of other strategies and plans, including (but not limited to):

- regional plans
- regional economic development strategies
- regional transport and infrastructure plans
- natural resource management plans
- water resource plans
- local and district disaster management plans
- local asset management and capital works plans
- local corporate and community development plans
- land use planning schemes
- local and regional health strategies.

The plan could also be considered relevant to charities, non-government organisations, not-for-profits, businesses, and government agencies with an interest in responding to the effects of drought in the region.

Regional profile

The Palm Island and Townsville Region is home to approximately 197,695 residents and spans across 72km^2 and 3 730.8km^2 of northern Queensland's wet and dry tropics respectively.[17] Townsville City is bounded by the Coral Sea in the north, Burdekin Shire in the east, Charters Towers Regional Council area in the south and west, and Hinchinbrook Shire in the north west.[18]

(Great) Palm Island, also known as Buruku'man (Burugu'mah), is situated 65 kilometres north east of Townsville and is one of 16 islands in the Palm Island Group.[19] In 1981 the Palm Island Group was deemed part of the Great Barrier Reef World Heritage Area. The neighbouring island, Magnetic Island or Yunbenun, is also world heritage listed and part of the Townsville City Council Local Government Area (LGA). It spans across 51.84km^2, with 78% of the islands designated as national or conservation park.[20]

Average annual temperatures between 2010 to 2020 were 27°C and 29°C at Lucinda Point (the closest mainland point to Palm Island) and Townsville Aero, respectively.[21] Average annual rainfall between 2003 to 2023 was 1229.7mm and 1852.1mm for Townsville and Palm Island, respectively.[22] Heatwave days constitute three or more days of high maximum temperatures uncharacteristic to the region and currently occur between 15 to 18 days of the year in the Townsville and Palm Island regions.[23] Under current climate projections, Palm Island is expected to increase by an additional 11 to 37 days and Townsville by a further 30 to 51 heatwave days per year, exacerbating strains on social and community services and infrastructure networks.[24]

History and heritage of the region

In the early 1900s the Manbarra people – the traditional owners of Great Palm Island – were dispossessed and relocated to mainland Australia. During the era of the Protection Act, a period of s trict government control of First Nations peoples, Aboriginal non-conformists from over 60 language groups were forcibly taken to Palm Island, which was used at the time as a penitentiary.[25] Non-indigenous workers on the island – including schoolteachers, storekeepers, and other staff – were sectioned into the 'white' housing area of the island built by Aboriginal community members.[26]

The impacts of the island's history translate into the contemporary setting. Conflict over governance disputes between the ancestors of over 46 groups on Palm Island has been a frequented issue. This led a Manbarra elder to devise the term 'Bwgcolman' meaning 'many tribes – one people' referring to the First Nations ancestors on the Island.[27] The state government owns and manages all properties on the Island, with residents asked to pay a single flat fee that covers rent and utilities.[28] Despite limited economic activity on Palm Island, there has been a drive to engage in community service and custodianship activities. The Bwgcolman values of community, Country, and kinship are illustrated through the recently established Bwgcolman Ranger Group who care for the land under the auspices of Manbarra peoples. More recently, there has been the introduction of a Community Watch Program, which has seen youth crime significantly reduce over a three-month period in 2023.[29]

The first peoples of Townsville are the Bindal, Wulgurukaba, Nywaigi, and Gugu Badhun Peoples. The Bindal people refer to the County as Thul Garrie Waja, while the Wulgurukaba peoples refer to Gurrumbilbarra Country.[30] In 1864 the city of Townsville was established and used as a port for the fledgeling pastoral industry in North Queensland.[31] During World War II, Townsville became a significant military base, accommodating over 90,000 Australian, American, and allied military personnel.[32] After the war, the population and mining boom accelerated Townsville's industrial base, setting Townsville apart within agriculturally dominant North and Central Queensland.[33]

Figure 5: Townsville and Palm Island Regional Map.[40]

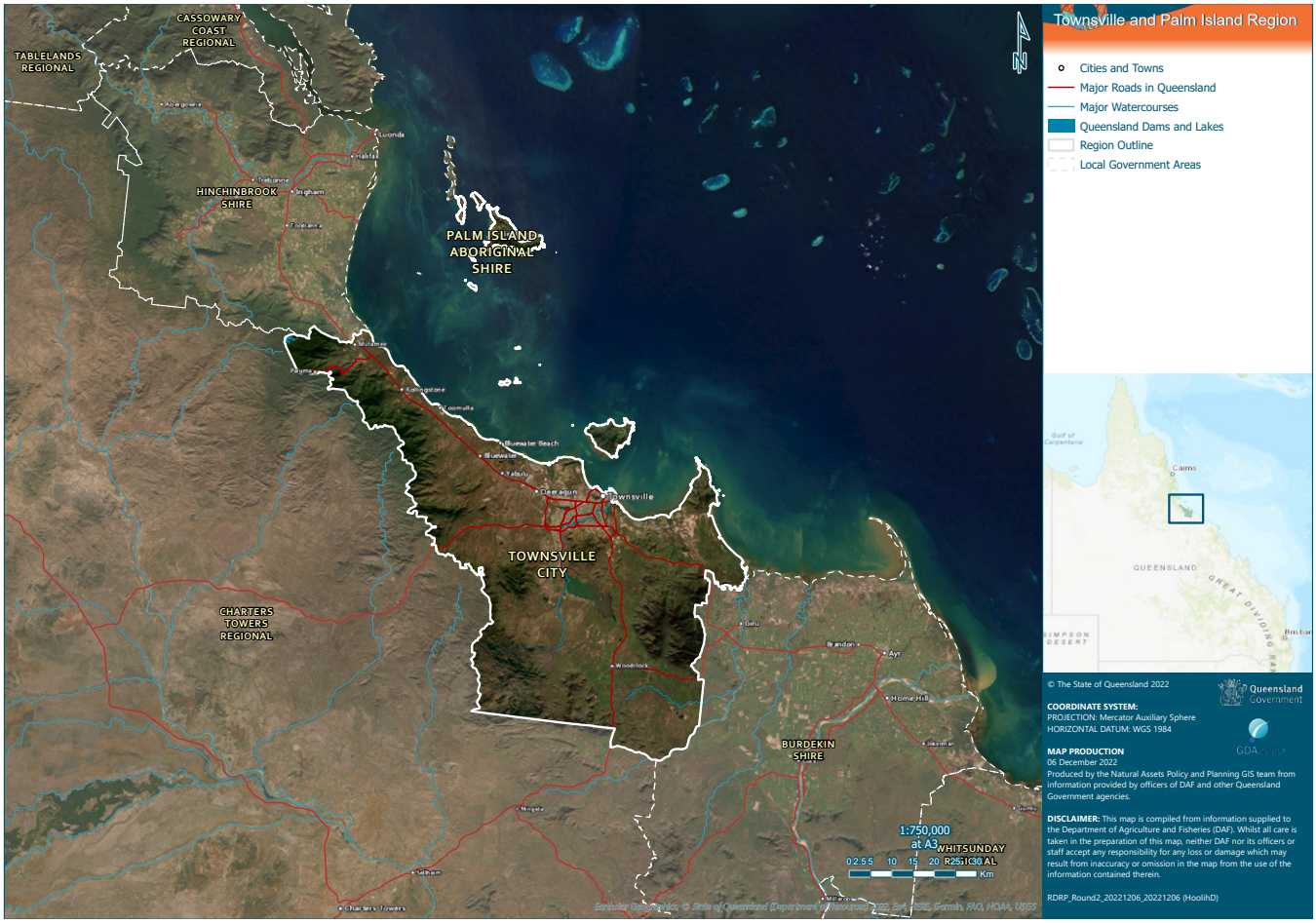


Figure 6: Townsville and Palm Island Socioeconomic Profile.[41]

	Palm Island LGA35790	Townsville LGA37010	Townsville and Palm Island	Queensland Average
Population (June 2023)	2,214	201,433	203,647	5,460,420
Projected population (2016 to 2041)	1.0%	1.6%	1.2%	1.6%
Median age of residents (June 2021)	26.3 yrs	36 yrs	35.8 yrs	38.4 yrs
% Aboriginal or Torres Strait Islander Peoples (2021)	91.4%	8.4%	9.3%	4.6%
% people who speak a language other than English at home (2021)	41.1%	8.3%	8.7%	15.6%
Median total personal income $/year (2021)	$380	$826	N/A	$787
Australian Digital Inclusion Index (2021)	70.0%	70.0%	N/A	71.1%
Unemployment rate (June 2021)	27.4%	2.2%	2.3%	3.9%
SEIFA 2021 Socio Economic Index of Social Disadvantage	567	990	N/A	897
Registered businesses (June 2022)	12	12,486	12,498	137,569
Persons with a profound disability needing assistance (2021)	3.3%	5.9%	5.9%	6.0%
Protected area – parks, forests, reserves area (2021)	0.0 km²	1,020 km²	1,020 km²	129,364 km²

Socioeconomic profile

The socioeconomic profile of the region *(Figure 6)* illustrates a clear contrast between the indicators for Palm Island as compared with the Townsville and Queensland averages. The Townsville LGA has a significantly larger population relative to the Palm Island LGA, with 201,433 and 2,214 persons, respectively.[34] Palm Island population estimates greatly differ from the Palm Island Aboriginal Shire Council (PIASC), who estimate between 4,000 to 5,000 residents on the island, attributing significant fluctuations to festivals and events.[35] Population projections estimate between 2021 to 2046, the joint region population is expected to increase by 1.2% on average, annually, sitting below the projected Queensland growth rate (1.4%). Most of this growth is anticipated within Townsville.[36] The local council however, Townsville City Council, are aiming for a 2.85% average annual growth rate to achieve a population of 220,000 people by 2026, with plans to increase population density in the urban footprint by 10%.[37]

In 2021, all regions Socioeconomic Index for Advantage (SEIFA) estimates sat below the national average score of 1,000.[38] Townsville, however, exhibited more advantage (990), relative to Queensland (897), and Palm Island (567). Palm Island's SEIFA score indicates significant socio-economic disadvantage for the region, which was further reflected in an exceedingly high unemployment rate (27.4%) relative to Queensland (3.9%) and Townsville (2.2%). Average weekly personal income on Palm Island ($380) was less than half of both Townsville ($826) and Queensland ($787) averages, with only 12 recorded businesses operating in 2021.

Townsville had a significantly smaller population proportion (8.3%) of those who spoke a non-English language at home, relative to Palm Island (41.1%). This could be attributed to the significant First Nations population on Palm Island (91.4%), as First Nations languages were identified as the most used non-English languages spoken on the Island.[39]

Image: View of Townsville City from Castle Hill

Regional economy characteristics

The Townsville LGA Gross Regional Product (GRP) was estimated at $12.66 billion, comprising 3.27% of Queensland's Gross State Product.[42] The City of Townsville is an economic powerhouse for the Greater Townsville and North West Queensland region, contributing an estimated majority share of 83.8% to GRP. In contrast, Palm Island has very little economic activity, comprising approximately 0.30% of the Greater Townsville and North West GRP.[43]

Industry breakdown

The Townsville LGA economy is spread across a diverse range of industries, in terms of both employment and economic output. Figure 7 demonstrates public administration and safety contributed the largest share to GRP (16.32%), followed by health care and social assistance (13.27%), construction (8.71%), and education and training (7.68%). Impacts of the COVID-19 pandemic between 2016/17 to 2021/22 saw increases in contribution to GRP in public administration and safety, information media and telecommunications, and health and social assistance by 6.14%, 115%, and 24.49%, respectively.[44]

Figure 8 shows industry shares of employment followed similar trends with the largest shares seen in health care and social assistance (17.73%), public administration and safety (12.27%), and education and training (9.9%). In terms of broad industry, the household services sector comprised 41.6% of employment in 2022, marking a 34.0% increase from 2012.[45]

Figure 7: Value added to City of Townsville, gross regional product by industry 2016/17 and 2021/22.[46]

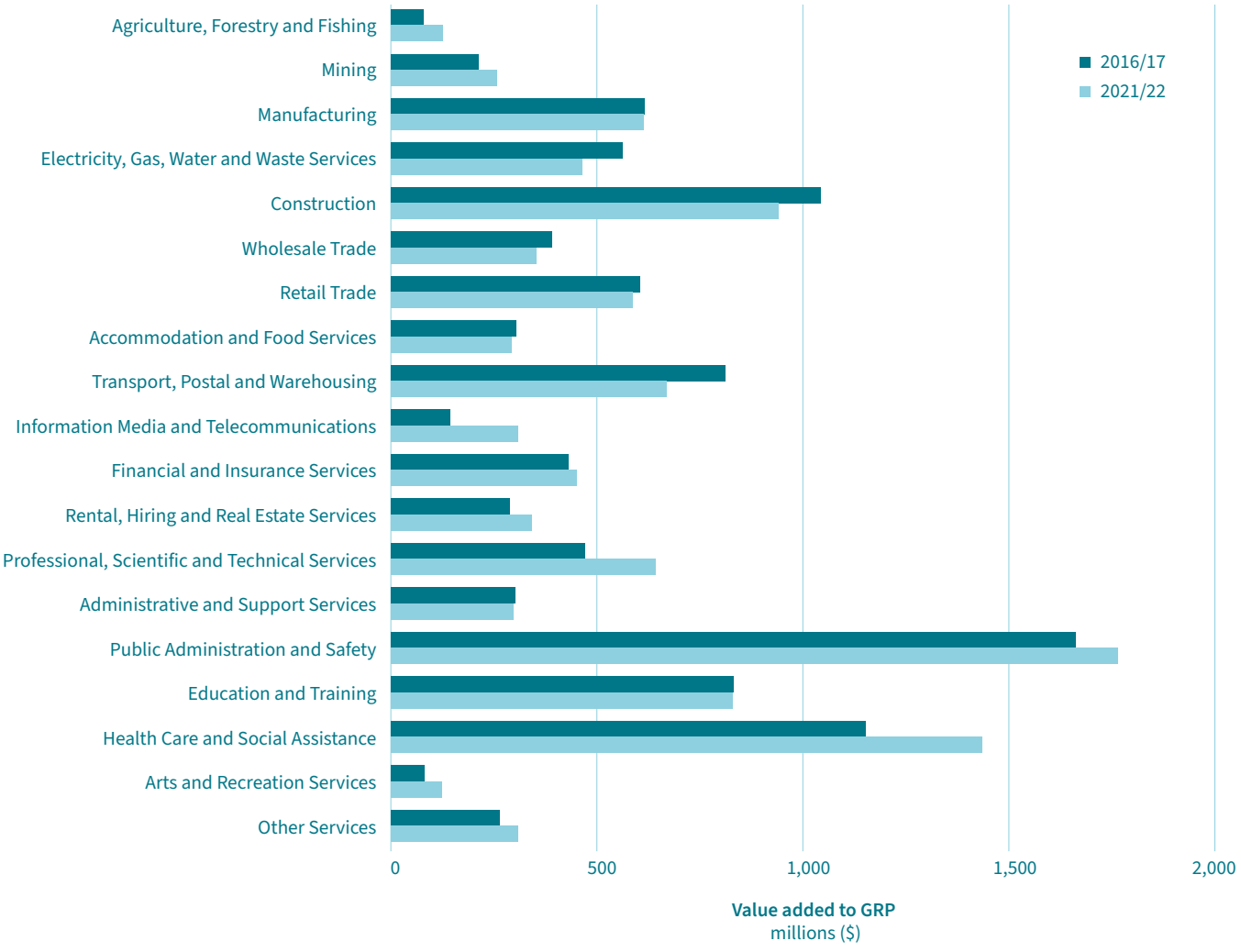
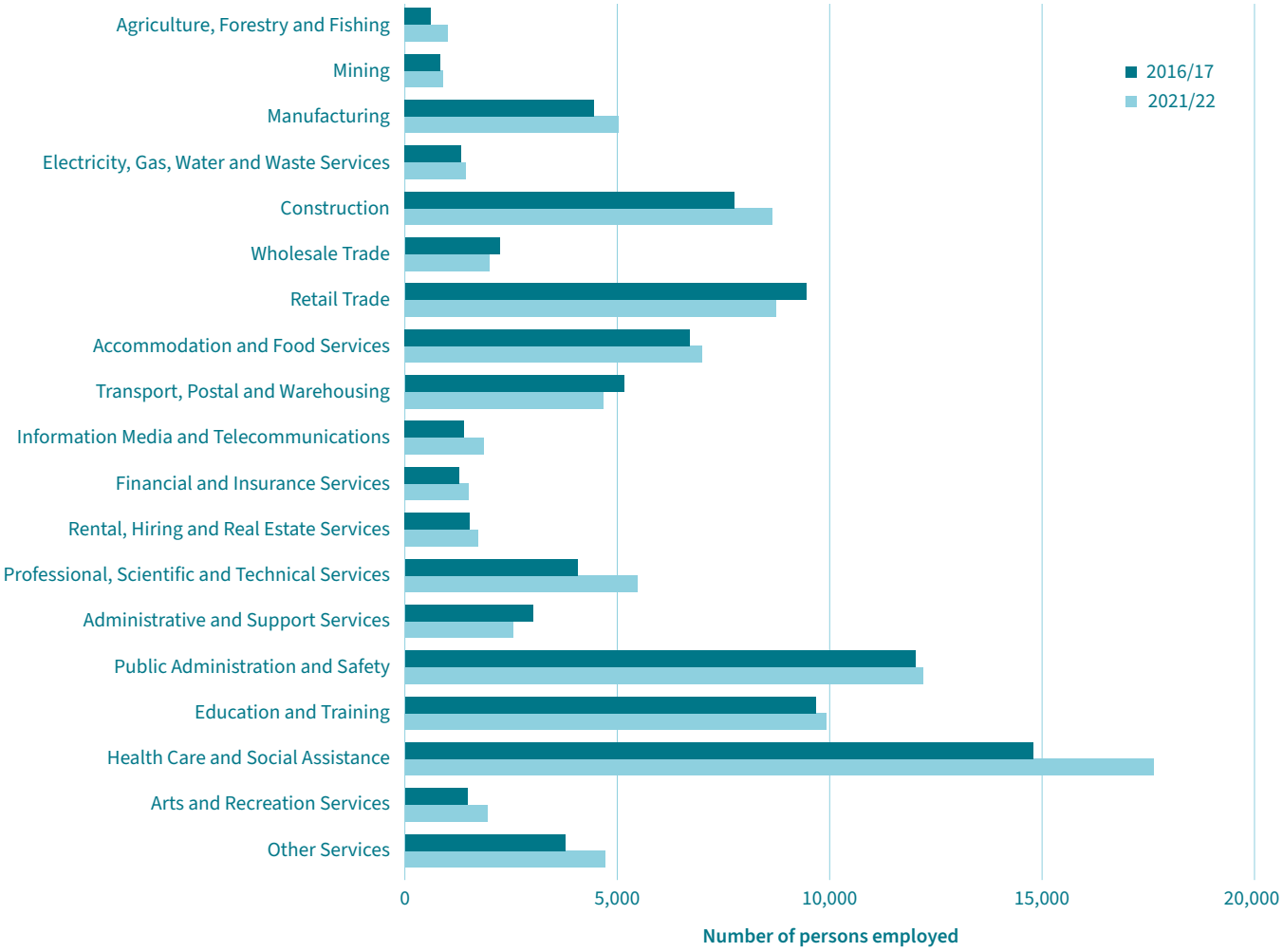


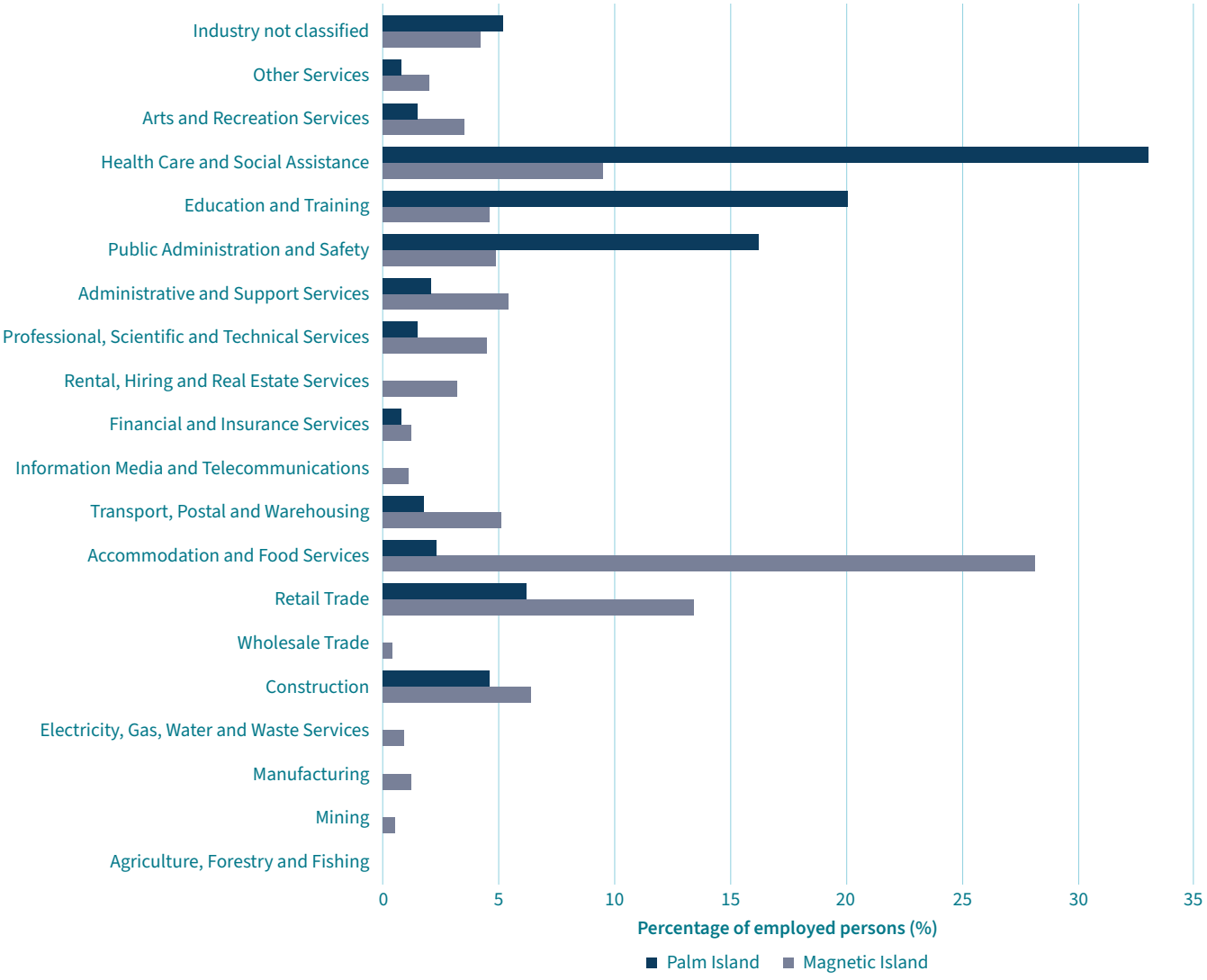
Figure 8: Total employed persons for City of Townsville by industry 2016/17 and 2021/22.[52]



As a subset of the Townsville LGA, Magnetic Island offers a more comparable setting to Palm Island with approximately 2,475 and 2,098 people living on the islands, respectively in 2021.[47] On Palm Island in 2022, there were a recorded 388 people in employed positions. Figure 9 shows Palm Island largely operates as a service economy, seeing the three largest industries of employment in health care and social assistance (33%), education and training (20.1%), and public administration and safety (16.2%).[48] From these industries, most Palm Island residents worked within primary education (12.4%), other social assistance services (11.2%), local government administration (8.8%), and hospitals (7.1%).[49]

In contrast, Magnetic Island emulates a more tourism-based economy, where industries with the three largest shares of employment were accommodation and food services (28.1%), retail trade (13.4%), and health care and social assistance (9.5%).[50] Certain industries, such as information media and telecommunications, had no employed persons on Palm Island, however, this is expected to change with the introduction of new infrastructure, such as a new retail precinct featuring a Telstra call centre.[51]

Figure 9: Total employed persons for Palm Island and Magnetic Island by industry 2022.[53]



Agricultural sector

The Agriculture, Forestry and Fishing industry added 1.2% of value to Townsville LGA GRP and employed 1,017 or 1.0% of Townsville LGA residents in 2022.[54] There were no agricultural industries recorded on Magnetic or Palm Island in 2022.[55] The Townsville agricultural industry is largely characterised by livestock, eggs, and other fruits *(Figure 10)*.[56] Rollingstone, situated at the northern beaches of Townsville, is among Australia's leading pineapple growing areas.[57]

Livestock slaughtering was the largest contributor to agricultural production, comprising 27.8% in 2020/21.[58] The centralisation of livestock slaughter in Townsville has been partly attributed to the lack of meat processing facilities in the north western region, with plans to potentially introduce an abattoir to reduce transportation costs.[59] Live exports of cattle are concentrated during the dry season, leading to prolonged shut down periods for Townsville abattoirs during wet seasons.[60] During the 2017 to 2019 drought, Queensland producers rapidly destocked cattle, transporting them to ports such as Townsville to export.[61] National herds since this drought have failed to return to pre-drought levels, which can have lasting impacts on the slaughter industry.[62]

Water usage within the Townsville LGA predominantly seen in farming pastures and cereal crops and sugar cane *(Figure 11)*. The majority of water used in the agricultural industry is collected from rivers, creeks, lakes, and other natural water sources within Townsville.[63] Farmers' profits have also been impacted by seasonal conditions within the last 20 years, with the Central Queensland Coast earning an annual profit average between -25% to 25% of the previous term (1950 to 2000).[64]

Figure 10: City of Townsville value of agricultural production 2020/21.[66]

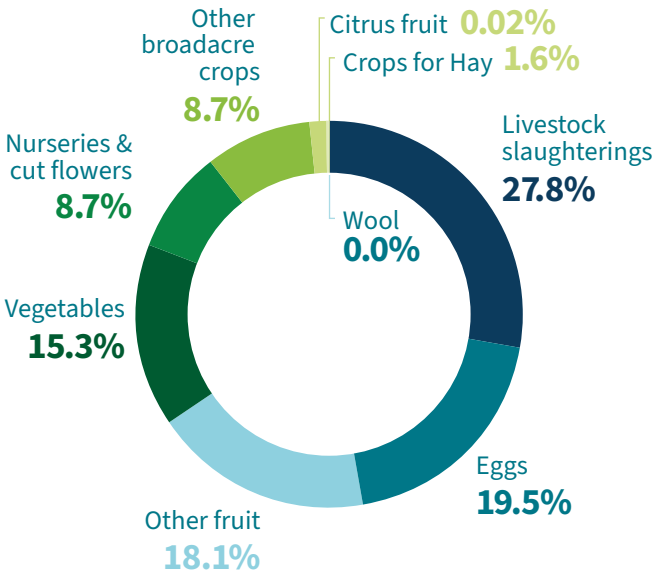
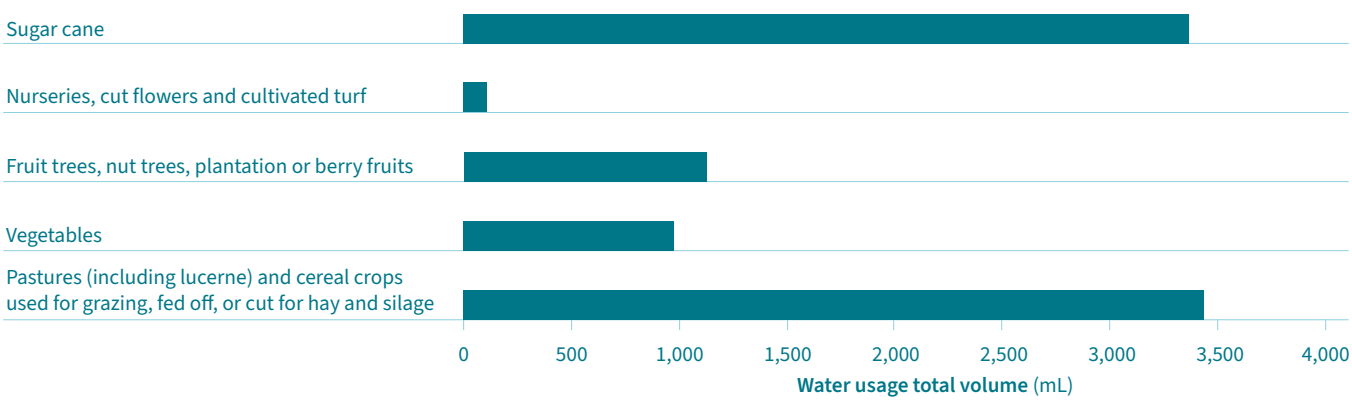


Figure 11: Agricultural water usage by commodity, Townsville LGA.[65]



Water supply and climate

Rainfall

The Queensland wet and dry tropics experience highly concentrated seasonal rainfall, influenced by factors including topography, vegetation, and broader climate patterns such as the El Nino Oscillation.[67] Average annual rainfall between 2003 to 2023 was 1229.7mm and 1852.1mm for Townsville and Palm Island, respectively.[68] Both the Townsville and Palm Island regions experience highly seasonally dependent rainfall, with highs typically from January to March, and lows experienced from June to October *(Figure 12 and 13)*.[69] A lack of reliable monthly rainfall data collection on Palm Island has impacted the comparison between the two local government areas. Comparing long term rainfall data from 1964 to 2023, illustrates an increase in annual rainfall patterns in both regions *(Figure 14 and 15)*. Townsville experienced a larger increase in average annual rainfall, from 1056mm between 1964 to 1993 to 1190mm between 1994 to 2023. Palm Island exhibited a smaller increase from 1716mm to 1805mm between the same time periods. Despite having a smaller change in long term annual rainfall relative to Townsville, Palm Island experienced significantly larger quantities of average rainfall.

Figure 12: Townsville Aero total monthly rainfall 2020–2023.[70]

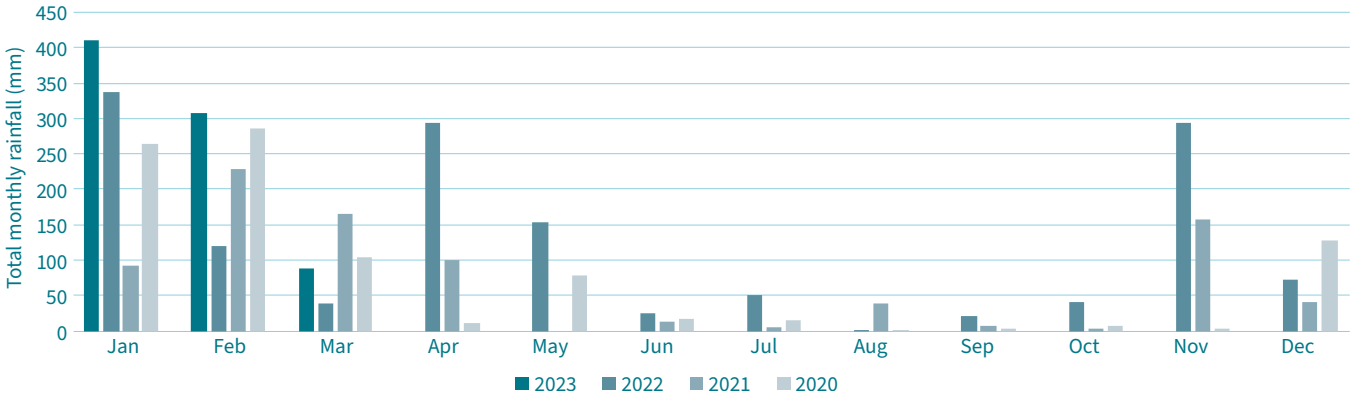


Figure 13: Palm Island total monthly rainfall 2009–2011[71].

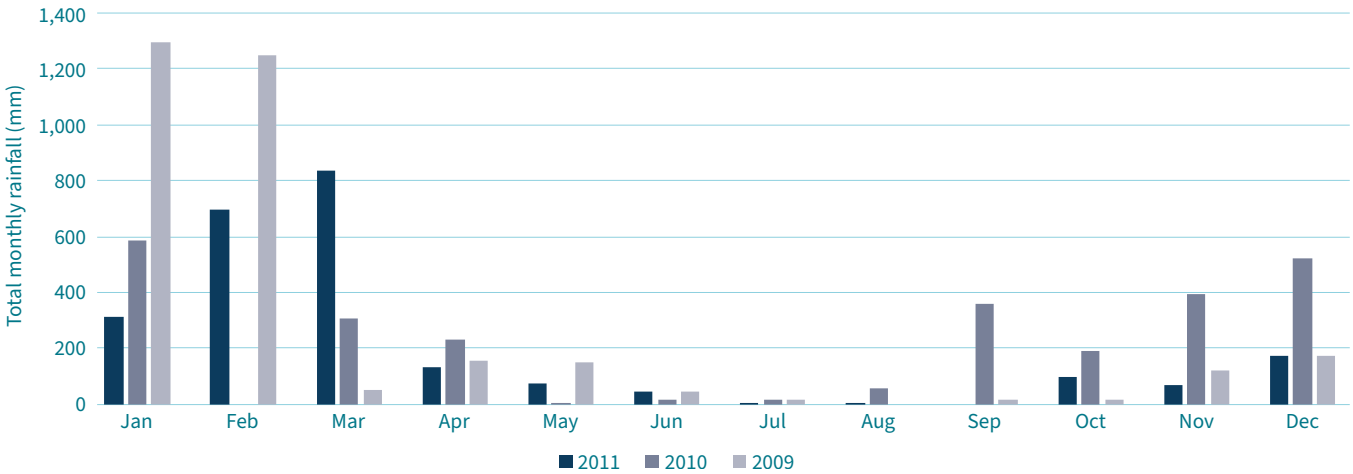


Figure 14: Townsville annual rainfall 1964–2023.[72]

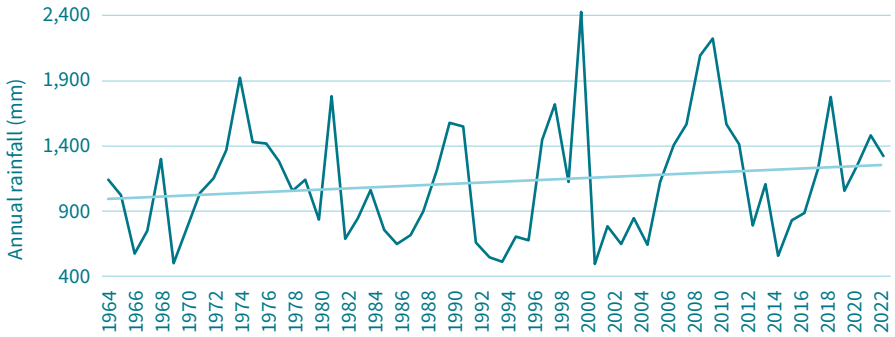


Figure 15: Great Palm Island annual rainfall 1964–2023.[73]

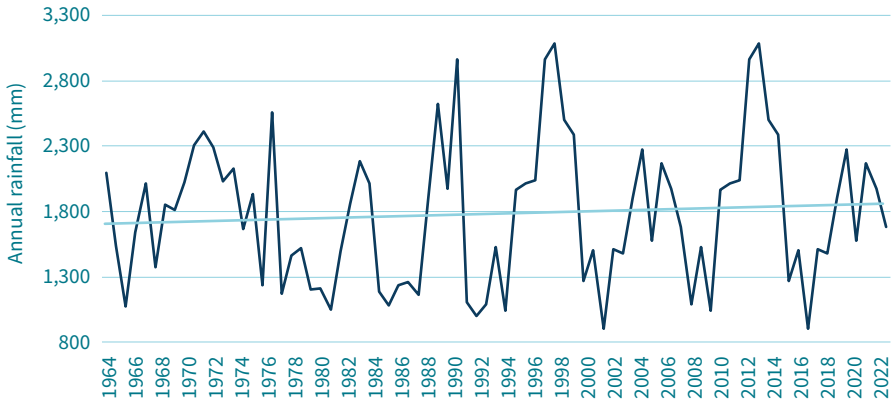


Figure 16: Annual rainfall Townsville and Palm Island 2000–2022.

Ross River Dam

The Ross River Dam is situated 19km southwest of its primary area of service, the City of Townsville, and is owned and operated by the Townsville City Council. A gated dam that at full capacity, holds 233,187ML and is comprised of an 8400m long earth and rock-fill embankment with a catchment area of 750km^2.
The dam is the main raw water storage in Townsville and provides approximately 85% of the water supply for the city annually.

Since establishment in 1974, the dam has undergone multiple upgrades, the most recent being the construction of three spillway gates in 2007. This has allowed for attenuation of flood waters through controlled releases when the dam reaches full capacity. Townsville City Council is currently investing in key water infrastructure including a new 9.5km pipeline to transport raw water from the Ross River Dam to the Douglas Water Treatment Plant for treatment and distribution to the city. This project will improve future water security for the Townsville Region in conjunction with the Burdekin-Haughton Pipeline *(refer to Case Study)*.

Water supply

In 2022/2023, Townsville City Council produced more than 44,000ML of potable water. Council provides water services through four main schemes:

- Townsville Drinking Water Scheme.
- Paluma Township Drinking Water Scheme.
- Giru/Cungulla Drinking Water Scheme.
- Burdekin Haughton Water Supply Scheme.

Image: Ross River Dam. *Source: Sunwater, 2019.*

To supply this water, Council operates and maintains two dams, two weirs, four water treatment plants, 27 water pumping stations, 41 reservoirs and over 2600km of water distribution mains. Despite the Ross River Dam being the primary water supplier for Townsville, the region also relies on other water storage facilities, particularly in events of low water levels during extended droughts or water contamination from flooding or algae. Council can access supplementary water allocation through contracted arrangements with Sunwater and pumping from the Burdekin Pipeline. Council is currently completing the Haughton Pipeline stage 2 which will provide a pipeline from the Burdekin River to the Ross River Dam to source up to 360ML of water each day to supplement supply to the dam in periods of low rainfall. Other key projects for the region include the recycled water re-use scheme, which will treat water from the Cleveland Bay Purification Plant to provide an alternative water source for irrigation and industrial use in Townsville.

In contrast to Townsville, Palm Island has a limited and aging water supply infrastructure. The Island features one water treatment plant that can treat up to 1.6ML of water per day, drawing from the Solomon and Minggudjamba Banbarribarra (Francis Creek) dams. The two dams store water in tanks which provide up to three days of reserves. During prolonged periods of low rainfall, the dams have historically fallen below demand levels, but quickly regenerate after light to medium rains return. The susceptibility of the Palm Island plant to contamination during intense weather events during intense wet and dry periods has also affected water security for the island *(refer to Case Study)*. Due to these vulnerabilities, Palm Island has suffered a long history with water shortages. Alerts of water contamination have occurred almost annually since 2015. In 2016, the Palaszczuk Government, commenced groundwater drilling for short term water supplies, and constructing a new $3.5m wastewater sewerage plant to meet long-term water demand needs. After a prolonged dry season in 2016, a desalination plant was also considered, however, shortly dismissed after dam levels quickly replenished after rainfall. There are currently no contingency measures in place for management, monitoring, or restrictions of water during water shortage. There have been community calls for better education around water quality, usage, and efficiency for Palm Island residents. Table 2 details the profiles for water storage facilities within the region.

	Year *Finished construction*	**Relevant service area/s**	**Council entitlements** *ML/annum*	**Volume** *ML*	**# Times dam exceeded 100% volume** *Since 2009*	**Catchment area** *km²*	**Gated** *YES/NO*
Ross River Dam	1974	Townsville	75,000	233,187	7	750	Y
Paluma Dam/ Crystal Creek	1958	Townsville	21,571	11,830	10	9.8	N
Burdekin Falls Dam	1987	Lower Burdekin	110,000 *Burdekin Haughton Scheme*	1,860,000	18	129,860	Y
Solomon Dam	1970s	Palm Island		470			
Minggudjamba Banbarribarra (Francis Creek) Dam	1990s	Palm Island		690			
Black's Weir	1935	Townsville *Not part of water supply system*		3,780			
Gleeson's Weir	1908	Townsville *Not part of water supply system*		490			
Alpin's Weir	1929	Townsville *Not part of water supply system*		1,800			
Giru Weir	1977	Townsville *Not part of water supply system*	110,000 *Burdekin Haughton Scheme*	1,025			N
Clare Weir	1978	Townsville *Not part of water supply system*	110,000 *Burdekin Haughton Scheme*	15,900			Y
Val Bird Weir	1983	Townsville *Not part of water supply system*	110,000 *Burdekin Haughton Scheme*	2,055			N
Bamboo Dam		Palm Island *Not operational*		70			

Case Study: Burdekin-Haughton Pipeline Scheme

Image: Stage 1 and 2 of Burdekin Haughton Pipeline. *Source: Infrastructure Australia, n.d.*

Location: Townsville, Queensland.

Investment: $285 million.

The Townsville City Council and Queensland Government funded Stage 1 of the Burdekin-Haughton pipeline scheme which involved duplicating 33 kilometres of pipeline between the Haughton channel and Ross River Dam. The pipeline works by extracting water from the Burdekin Falls Dam, Giru Weir, Clare Weir, and the Val Bird Weir through the existing Haughton Main Channel. Stage 1 was completed in 2019 and allows Townsville to access an additional 234ML/day.

Stage 2 of the Burdekin to Haughton Pipeline scheme began in October 2023 and is expected to be completed in 2025. It involves the construction of 28 kilometres of pipeline, a new pump station, and high voltage power supply infrastructure allowing for an additional 273ML of water per day.

Independent evaluations have criticised Stage 2 works. Infrastructure Australia, for example, found constructing Stage 2 would not provide additional water security to Townsville beyond Stage 1 construction and would cost significantly more than the expected benefits. It was further noted the Government failed to consider the 21 long-term options identified by the Townsville Water Security Taskforce, which included upgrades to the Ross River Dam, new water storage facilities, and utilising alternative water sources.[75]

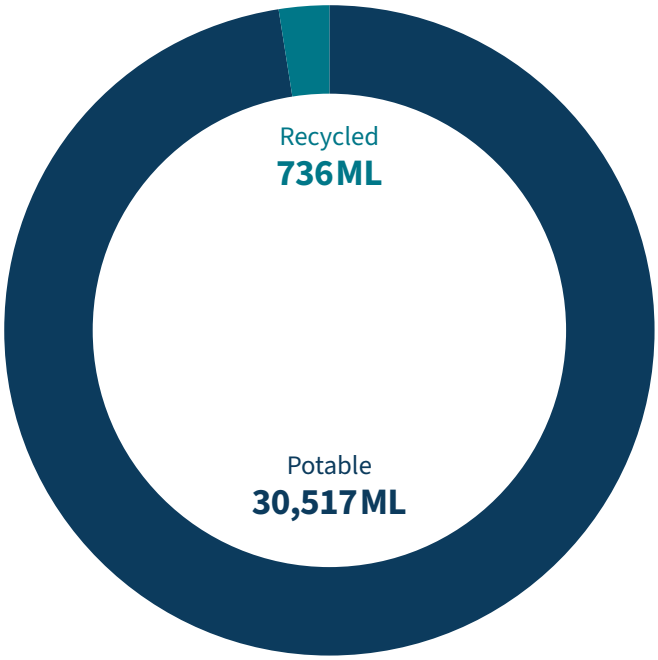
Water demand

The Townsville water reticulation network must meet demand needs for three key stakeholder categories:

- **Residential:** household water uses for drinking, cleaning, gardening etc.
- **Non-residential:** water for commercial purposes. e.g. restaurants, parks, gardens, nurseries, and offices.
- **Industrial:** Copper Refinery, and other major industries.[76]

Water demand varies by type. In 2020, potable water was in significantly higher demand than recycled water *(Figure 17)*.[77]

Figure 17: Water demand by category, Townsville in 2020.[87]



Irrigation of private lawns and gardens, public parks and spaces is a key driver of potable water demand within the region.[78] Consequently, Townsville residents use four times more water than their counterparts in other major cities, with 70% of that demand attributed to water use for lawns and gardens.[79] In 2021/2022, Townsville City Council produced over 44,000ML of potable water. Many customers in Townsville chose the Standard Plan water billing option. The residential bill for water under the Standard Plan is $942 per year, which includes a water allocation of 772kL. The highest daily demand for this period was 184ML, which is slightly lower than the previous year at 230ML.[80] Townsville's existing water supply system has raised concerns around future water security, leading to the construction of the Burdekin Haughton pipeline *(refer to Case Study)*. Design of the Ross River dam has also posed issues for water supply, as flood mitigation strategies to construct the dam low and wide has made the dam significantly more susceptible to evaporation.[81] Current estimates suggest the Ross River dam loses 20 to 40 mega litres of the 130ML pumped to Townsville each day.[82]

According to PIASC, the Palm Island water treatment plant produces approximately 1.6ML/day and estimates maximum demand in winter and summer at 1.2ML/day and 2.5ML/day, respectively. The absence of water meters on Palm Island means precise consumption data is not available and inhibits monitoring and regulation of water usage. Overall estimates have indicated average water demand is 1.5ML per day, with individuals using an average of 375L per day and peaking at 675L.[83] Although these water demand levels are comparatively low for a North Queensland region, the residential demand may be higher as there is no industry on the island and population significantly fluctuates. With higher average numbers of residents per household, Palm Island sees far higher household use than the Queensland average. In 2021, Palm Island saw an average of eight people use 2,830L of water per day, compared with an average of 2.6 Queensland residents using 556L of water per household per day.[84] The maximum day demand is higher than the Palm Island Water Treatment Plant can produce because the levels in the Main Reservoir drop, even when the plant is running continuously at 100%. Wet seasons can also overwork the Water Treatment Plant and contaminate the drinking water *(refer to Case Study)*. Prolonged dry seasons have also posed issues for water security on the island with the severe water shortage in 1993–94 and alerts of significantly low dam levels and water shortages issued close to yearly.[85] Recommendations for more efficient water use for the Island range from smaller initiatives, such as installing water filters on taps, to large infrastructure renewal through new solar hot water systems and augmentation of water supply dams and pumped hydro storage.[86]

History of drought in this region

The Townsville and Palm Island regions have a long history of prolonged dry seasons, with the majority of Townsville situated within the dry tropics. Despite the region's familiarity with drought, the slow-moving and unpredictable nature of the duration and severity of such events can generate devastating and long-standing effects.[88] Notable historical drought events are outlined in Table 2.[89]

According to the 2023 Queensland Drought Duration Report, the Townsville and Palm Island regions have been drought declared 10–20% of the time since 1964 *(Figure 19)*.[90] In recent history, the region has been free of drought for the last four to five years as of April 2023 *(Figure 18)*.[91] According to the 12 month Australian Combined Drought Indicator (CDI), the last time the region was categorised as extreme and exceptional drought was in February 2016. Extreme and exceptional droughts are said to occur every 20 to 50 years respectively.[92]

Table 2: Previous Droughts in Australia Relevant to Townsville and Palm Island Regions.[93]

Event	Time period	Primary location	Key causes	Key impacts
Federation Drought	1895–1901	All Australia, particularly QLD coast.	Below average to record-low rainfall central/eastern Australia.	Sheep/Cattle Losses. National wheat crop at lowest yields of century.
World War II Drought	1937–1945	NSW, VIC, most of QLD, parts of WA.	Below average rainfall. Intense dry weather.	Black Friday bushfires. Water shortages. Dust Storms.
1965 – 1985 Drought	1965–1968	All Australia, QLD greatly affected.	Eastern Australia seesaws between intense wet and dry conditions. Record dry conditions in southeast.	Severe Spring bushfires.
The El Nino Drought	April 1982–February 1983	All Australia, WA less affected.	Strong El Nino. Rainfall deficiencies for up to a year. Clear skies and low atmospheric moisture levels cause intense dry conditions. Failed wet season in the north.	Ash Wednesday bushfires.
The 2017–2019 Drought	2017–2019	All Australia.	Western QLD: Dry conditions from 2012–15. Record low rainfall across Murray-Darling Basin. Extreme dry conditions: consecutive dry, cool seasons.	Devastating and long-lived bushfires. Spring 2019: Highest fire weather danger as measured on the Forest Fire Danger Index.

Figure 18: Months without drought[94].

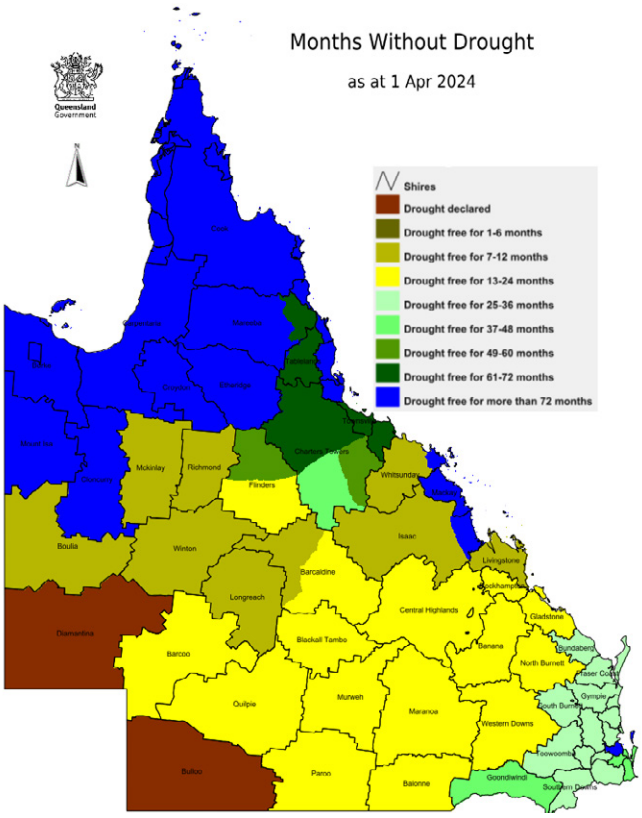
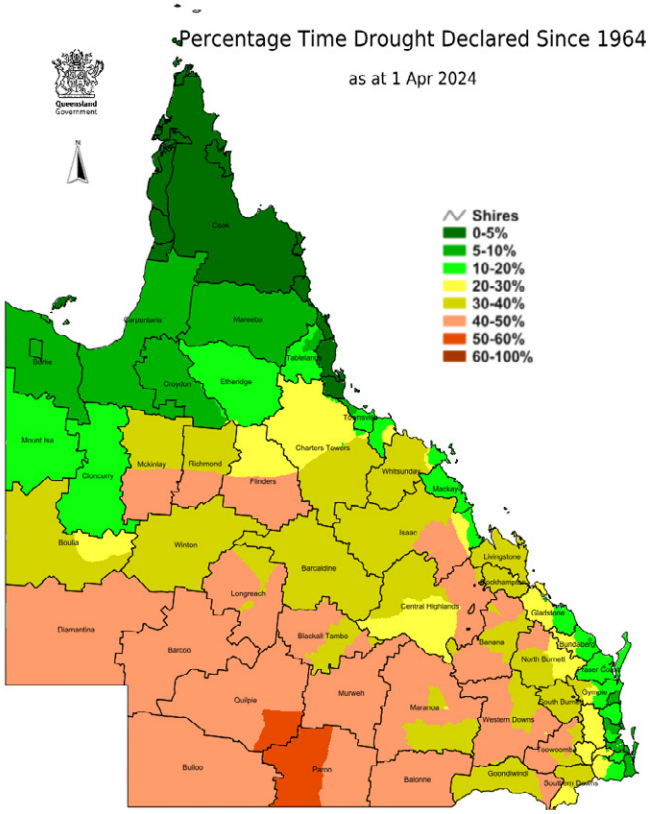


Figure 19: Percentage time drought declared since 1964.[95]

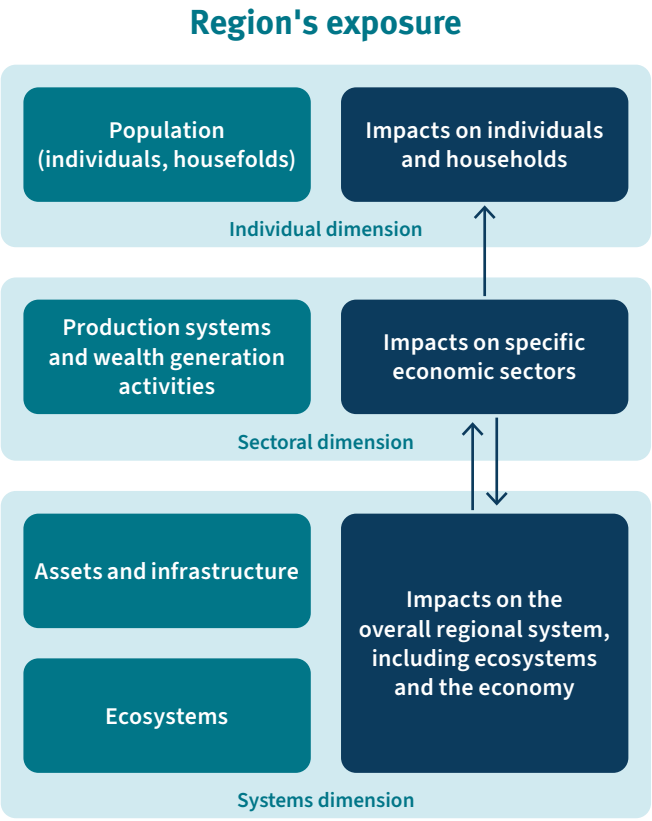


Past impacts of drought in this region

Given the absence of a significant agriculture sector, the Townsville and Palm Island region has historically been impacted by drought differently to the neighbouring local government areas.

However, in considering the impacts of drought across different pillars, the Commonwealth Scientific and Industrial Research Organisation (CSIRO)[97] argues we must understand all potential aspects. CSIRO proposes a model for understanding impacts at individual sectoral and systems dimensions.

Figure 20: Dimensions of cost of drought.[96]



Palm Island

With its high unemployment, absence of commercial activity, and reliance on government delivered services, Palm Island experiences drought largely through its impacts to the environment and the community.

Current Palm Island residents – especially women and children – tell stories of being relocated to Townsville, Ingham or other coastal towns in the early 1990s as the island did not have enough potable water to support its population. This led to social disruption as families were split and found themselves incurring significant costs to visit the mainland to enable family to be together. The disruption also affected the continuity of children's education and the level of services available on the island.

The Palm Island community are keen on having teams that play Rugby League and other sports on the mainland. All sporting facilities are outdoors and subject to climatic conditions (heat, rain, long drys) and the impact of hundreds of brumbies on the island. These factors affect the community's ability to participate in these sports and gain the associated physical and mental health benefits.

Great Palm Island, the largest of the 16 islands in the group, is rich in natural beauty of both fauna and flora but has been impacted by human settlement and introduced species. Great Palm Island's rich volcanic soil supports tropical flora such as mangroves, eucalypt forest, rainforests, hoop pine, mango, banana, pawpaw (papaya) and wild plum trees. The environmental significance is further illustrated by the ocean surrounding the island is in the Great Barrier Reef Marine Park (GBRMP). Under the zoning authority of the Great Barrier Reef Marine Park Authority (GBRMPA), the ocean on the western side of the island is in a Habitat Protection zone. The rest of the island is surrounded by a Conservation zone. Such a sensitive environmental area has been subject to the damaging effects of cyclones, floods and heat waves and drought.

Researchers are investigating the impact of the climate and how it has impacted the surrounding GBRMP, particularly the effects on corals of increased temperature. Reduced rainfall both in quantum and seasonality is also affecting the rainforest covering the bulk of the island.

A Land and Sea Ranger program has been recently established to use First Nations' knowledge and expertise to manage the risk of fire on the Island and protect and nurture vegetation such as the local wetlands.

Case Study: Water contamination on Palm Island

Image: Palm Island Water Treatment Plant. *Source: GanDen, n.d.*

Location: Townsville, Queensland.

Investment: $285 million.

The Palm Island Water Treatment Plant was constructed in 2017 with a $1.3 million investment from the Queensland Government. The project aimed to "supply reliable, quality water" to Palm Island residents, as well as assist with local employment.[98]

The Palm Island plant has consistently been either under supplied during dry periods or overburdened and contaminated during heavy rainfall. The 2018/19 summer rain, for example, overburdened the plant and turned residents' tap water brown and murky.[99] From February to May 2019, the local Council, PIASC, and the Queensland Police Force issued daily emergency alerts to warn residents on Palm Island the drinking water was unsafe, asking them to boil all tap water used for consumption until further notice.[100]

In response, the local Council imported pallets of bottled water from the mainland accruing a total expenditure of $300,000 by May 2019.[101] (Then) Councillor Lacey reported the decades-old reservoir and a main tank built in the 1950s were attributed to the contamination.[102] This caused significant health issues for locals, with cuts being infected from bathing in the contaminated water. By May 2019, sick Palm Island residents on dialysis were evacuated to Townsville.[103]

Townsville

Liveability studies conducted by Townsville City Council demonstrate the community highly values its lawns, parks and public spaces and the cool, green amenity they provide. They also value the opportunity to develop and maintain their own personal gardens. Hot and dry conditions increase community stress and create angst when water is not available or is too expensive to maintain the desired amenity. Anecdotally this is shown to have a particular effect on the mental health of many, particularly senior citizens for whom their gardens are a lifestyle focus.

Heat waves, defined by the Bureau of Meteorology[104] as when the maximum and minimum temperatures are unusually hot over three or more days as compared to the local climate and past weather, are known to cause physical illness and psychological stress – especially in the aged or those in lower socioeconomic circumstances who cannot afford to install or run air cooling technologies.

Heat conditions are expected to increase for the Townsville and Palm Island region from 2030–2090 with expected increases of 0.8-1°C in 2030 to >5°C by 2090 compared to the reference period (1986–2005) as illustrated by the following heatwave maps *(Figure 21, 22)*.[105] Figure 21 illustrates heatwave projections under high emissions (RCP 8.5), which refers to the continuation of rapid increases in greenhouse gases to the end of century without adaption from some systems to the large changes in climate (business as usual). In contrast, Figure 22 illustrates the RCP 4.5 Medium emissions scenario, where greenhouse gases are reduced significantly by the end of the century, however, adaptation continues to become harder over time.[106]

A new report by the Australian Institute of Health and Welfare (AIHW) – *Let's talk about the weather: injuries related to extreme weather* – shows in the 10 years from 2012 to 2022, extreme heat was responsible for most weather-related injuries and bushfire-related injuries increased during El Niño years. From 2019 to 2022, there were 2,143 hospital admissions related to extreme heat, including 717 patients from Queensland.

Among the risks to the natural environment from future dry seasons and the anticipated increase in heat, bushfire looms large. The Townsville region experiences bushfires on its outskirts almost annually. As the urban spread continues and housing estates are created on the edge of these bush areas, the risks to housing and property becomes greater. Of particular concern is the threat to the community on Magnetic Island and Palm Island. Both settlements are characterised by small strip settlements on the beaches of a couple of bays, while the majority of the island is covered with rainforest which can be susceptible to dangerous bushfires in dry periods, when the fuel has been allowed to accumulate. Neither of these islands have sufficient firefighting equipment to deal with a blaze beginning in the forest and threatening the residential areas.

Figure 21: Heatwave projections, Townsville LGA 2030 to 2090 **RCP 8.5 High Emissions.**[107]

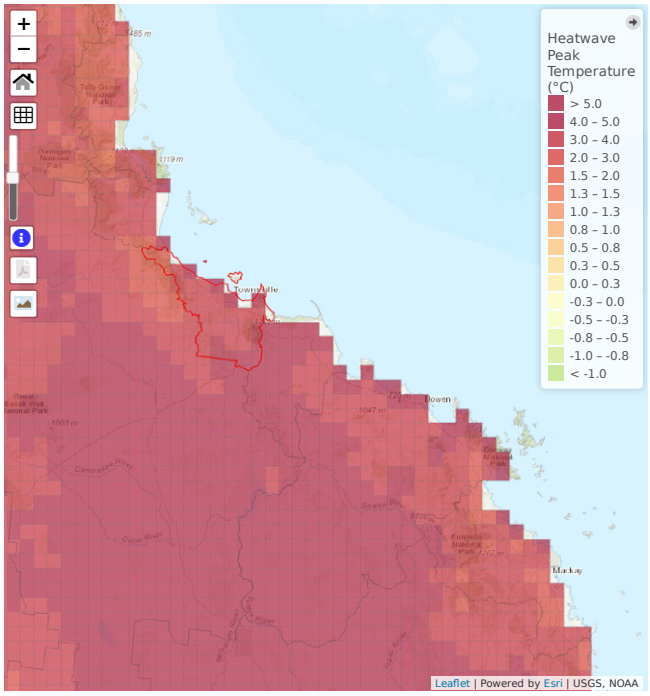
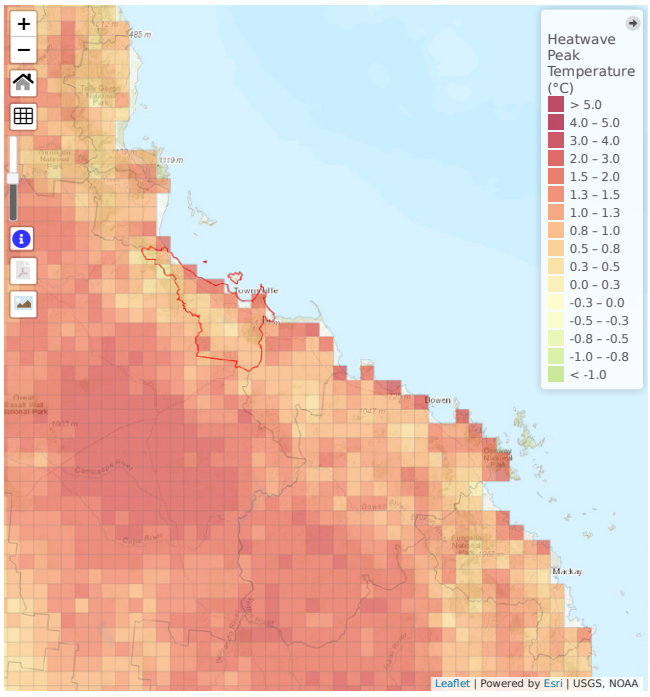


Figure 22: Heatwave projections, Townsville LGA 2030 to 2090 **RCP 4.5 High Emissions.**[108]



Human settlement has seen the introduction of non-indigenous plant species which constrain the growth of natural species and often tend to recover more quickly from shocks such as drought and fire. Local traditional rangers have been working with the Department of the Environment, Tourism, Science and Innovation to manage risks, and to support biodiversity and encourage natural systems restorative and sustainable practices.

Residential development in Townsville since the earliest time has been characterised by landscaping more akin to the temperate zone or the wet tropics which fails to recognise the area is in the dry tropics and plants/lawns thriving in Brisbane or Cairns do not flourish in this area because of their high demands for water. This tendency has been identified as one of the causes of Townsville's dry and dusty look, challenging if the region showcased more natural vegetation and rethought the "English" lawn and protected its soils, the seasonal swing from green to brown might be minimised.

Much to the chagrin of political leaders and tourism leaders, Townsville has historically been given the unflattering nickname of "Brownsville". Despite attempts to shake this title and green the city, every time there is an extended dry and the city cannot maintain the watering levels required for a lush green environment, the negative reputation damage reoccurs and community pride and satisfaction drop. This has led to a politicisation of the issue and promises to address the damage through water security including the construction of the Haughton pipeline *(refer to Case Study)*.

Townsville's economy is not only affected by drought within the confines of the LGA boundary – as an economic centre for North Queensland – it is also impacted by drought in the surrounding areas. For example, when there is a drought in Western Queensland, the Townsville economy has been known to experience a short uplift as graziers destock and send cattle for processing, and purchase feed and storage or watering systems. However as the drought progresses and the meatworks and the Port of Townsville slow down, and there is no available money to spend in the city, Townsville experiences a down turn. The precise scale of this economic impact has not been reliably quantified, however it is generally accepted as an impact.

Image: Palm Island. *Source: Selectability Palm Island.*

Likely future impacts (risks) of drought in this region

Projections for future climatic conditions for the Townsville and Palm Island region indicate an increase in temperature and a rainfall pattern becoming steeper and deeper – that is, heavy rainfall over a shorter period of time. The latter is particularly problematic in that once water storage facilities such as dams are full, additional rainfall cannot be captured and if the period between rainfalls is longer, the storage top up time is extended.

The number of hot days (above 35°C) in the regions are estimated to significantly increase between 2030 to 2090, particularly for Great Palm Island (Figure 23).[109] Under the business-as-usual scenario, RCP 8.5, Great Palm Island is expected to increase from an average of three hot days annually to approximately 56. Townsville is expected to experience a significant increase to a smaller extent relative to Palm Island, increasing from three heatwave days on average to 28 days. These climate changes will likely have significant impacts on industries. This is particularly pertinent for the Townsville region, which is an integral component of supply chains for the agricultural and livestock industries of the North West.

Figure 23: Average number of hot days, Townsville and Palm Island LGAs 1964 to 2085[113].

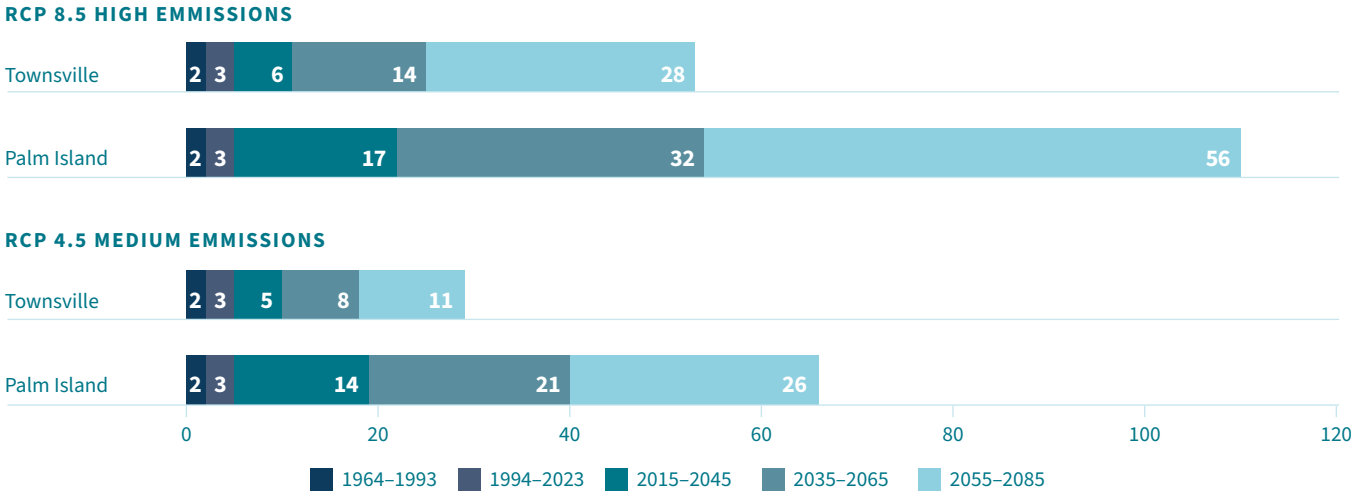
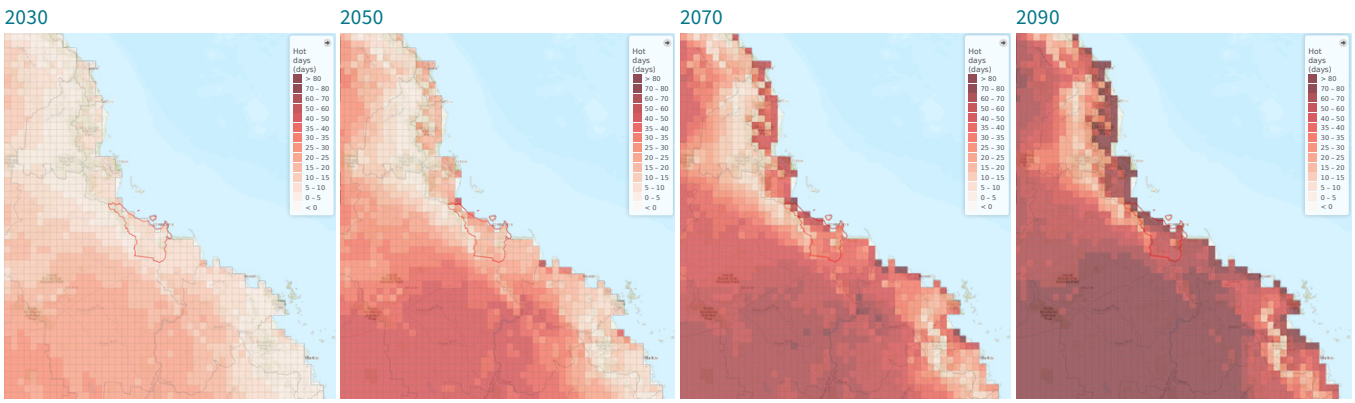


Figure 24: Number of hot days, Townsville and Palm Island LGAs 2030, 2050, 2070 2090 **RCP 8.5**[114].



Any discussion of the future impacts of drought on the Townsville and Palm Island region needs to address two perspectives, the:

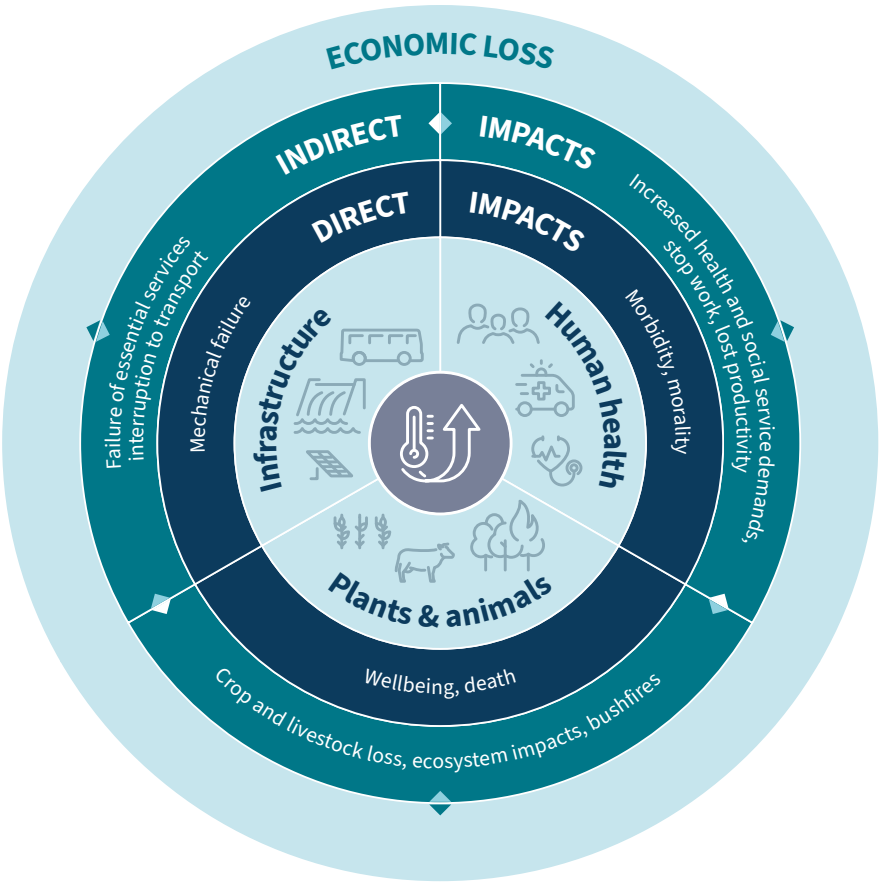
- direct impact on the environment, community, and economy – both positive and negative
- opportunity cost of the drought on planned growth.

As illustrated by the model depicted in Figure 25, heatwaves have direct impacts including human and animal mortality, but they also cause numerous indirect impacts. These include impacts such as stress on electricity networks, emergency services, hospitals and infrastructure stresses such as road damage and transport delays when railway lines buckled under the extreme conditions.

The impacts of severe heatwaves are likely to affect all sectors of the Australian community, from the public to government organisations and industries, health, utilities, commerce, agriculture, and infrastructure.

Heatwaves are expected to increase in frequency (in response to climate change) and may become more intense. Research published by Doctors for the Environment Australia suggests the death toll from heatwaves in Australia has exceeded that for any other environmental disaster, including floods, bushfires, and cyclones.[110] Older people (i.e. over 65 years) are at a highest risk of dying during hot weather particularly due to reduce thermoregulatory capacity and increased cardiovascular vulnerability. It is estimated 1,100 people in this age group die each year in Australian capital cities because of high temperatures.[111]

Figure 25: Managing for the impacts of heatwaves.[115]

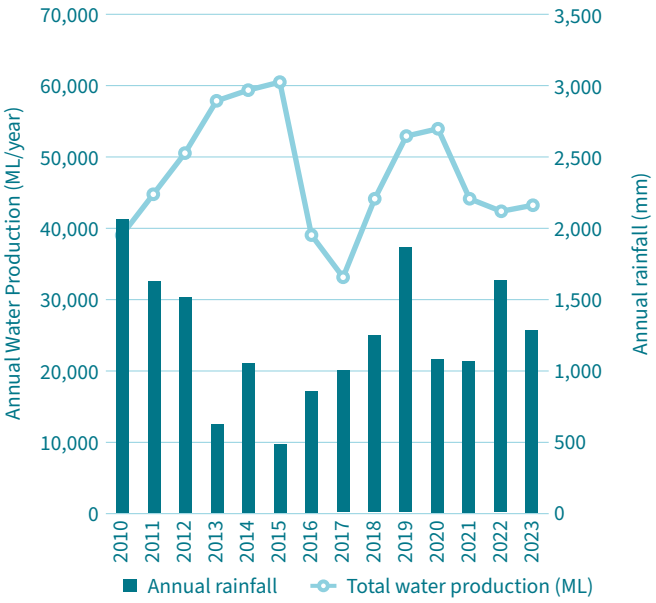


Woodruff et al.. suggest the impact of projected hotter temperatures – assuming no change in social adaptation – could result in an increase in death rates by half to three times, depending on the greenhouse gas emission scenario. Noting without any policy action, the number of heat related deaths could be up to 15,000 per year in 2100. As mentioned previously, the Townsville region is anticipating significant industrial and commercial growth in both the immediate and longer-term future, this will be accompanied by a parallel growth in population and water demand as illustrated below.

This ongoing growth of heavy industry and industrial water demand is a key concern for future water supply in Townsville. The Regional Water Supply Security Assessment Townsville projected total water demand in the region until 2036, reserving 745L/day for serviced populations and an additional 17ML/day for industrial water demand *(Figure 16)*.[112] It was further noted dry periods may prompt higher rates of water extraction for uses like outdoor watering. Figure 26 suggests total water extraction significantly exceeds total rainfall in the Townsville region between 2006 to 2023 with the exception of 2010.

Townsville's planned growth is predicated on a sufficient supply of water for industry and residential use, a liveable environment and connectivity to the remainder of North Queensland as suppliers of human and material resources for the economy. A period of unprecedented drought poses a serious risk to this opportunity which would not only impact the local context but could have state, national and international ramifications.

Figure 26: Total water extracted by Townsville reticulation network and annual rainfall for Townsville.[116]



Assuming Townsville does continue its planned economic growth in the event of a drought, this will increase the impact on the growing population and current environment. The demand for physical and mental health support, social services, natural environment protection and sustainable infrastructure (as discussed) as impacts of drought to date will be increased.

Image: Ross River, Townsville

Scenario discussions

The following scenarios were discussed as part of the Regional Forum and with several key stakeholders following the event.

	Scenario One What if a serious heat wave was coupled with another disaster e.g. flood/cyclone?	**Scenario Two** What if the cost of water was to increase by 30% or more?	**Scenario Three** Rainfall becomes steeper and deeper i.e. more rainfall over a shorter period.
Likelihood	This is a reasonably likely scenario with precedent in nearby regions who have transitioned from drought declared to flooded or have recovered from a flood only to be drought declared very shortly thereafter.	Given the increasing demand for water and increased costs in operating a treatment and distribution centre, this was a realistic situation for Townsville City Council. Palm Island Council does not charge water rates separately, residents pay a single fee for services so this may not be a scenario for Palm Island residents. There is potential to add water metres to commercial and construction sites and recoup some costs.	This is a highly likely scenario given the rainfall data available for the next 50 years.
Impacts	• Personal trauma and mental health issues. • Economic disruption – unemployment or skills shortage, small business closure. • Increased fire risk with increased fuel available. • Health issues – a heat wave after a flood would increase mould and associated health issues.	• Affordability pressures on residents. • Increased costs to business and industry which could threaten viability. • Community/sports groups face additional costs that make them unviable.	• Water storage facilities – i.e. dams, tanks, reservoirs, and rivers – are filled quickly, with overflow capacity and excess water wasted. • Longer gaps between rainfall means the reservoirs are not topped up and could run out of water. • Vegetation experiences flood-like conditions and then no rain. This leads to soil loss and degradation. • Increased fire risk with longer dry periods.
Resilience Building	• Community capacity building and connectedness activities. • Business risk and contingency capacity building. • Integrated approach to disaster management.	• Model demand scenarios to calculate cost/price. • Community education campaigns to support water conservation methods.	• Plan for changed water collection patterns – this will be a major impact on Palm Island – with additional water storage required. • Promote natural systems integration and restoration. • Consider likelihood of flooding in building approvals and property development conditions.

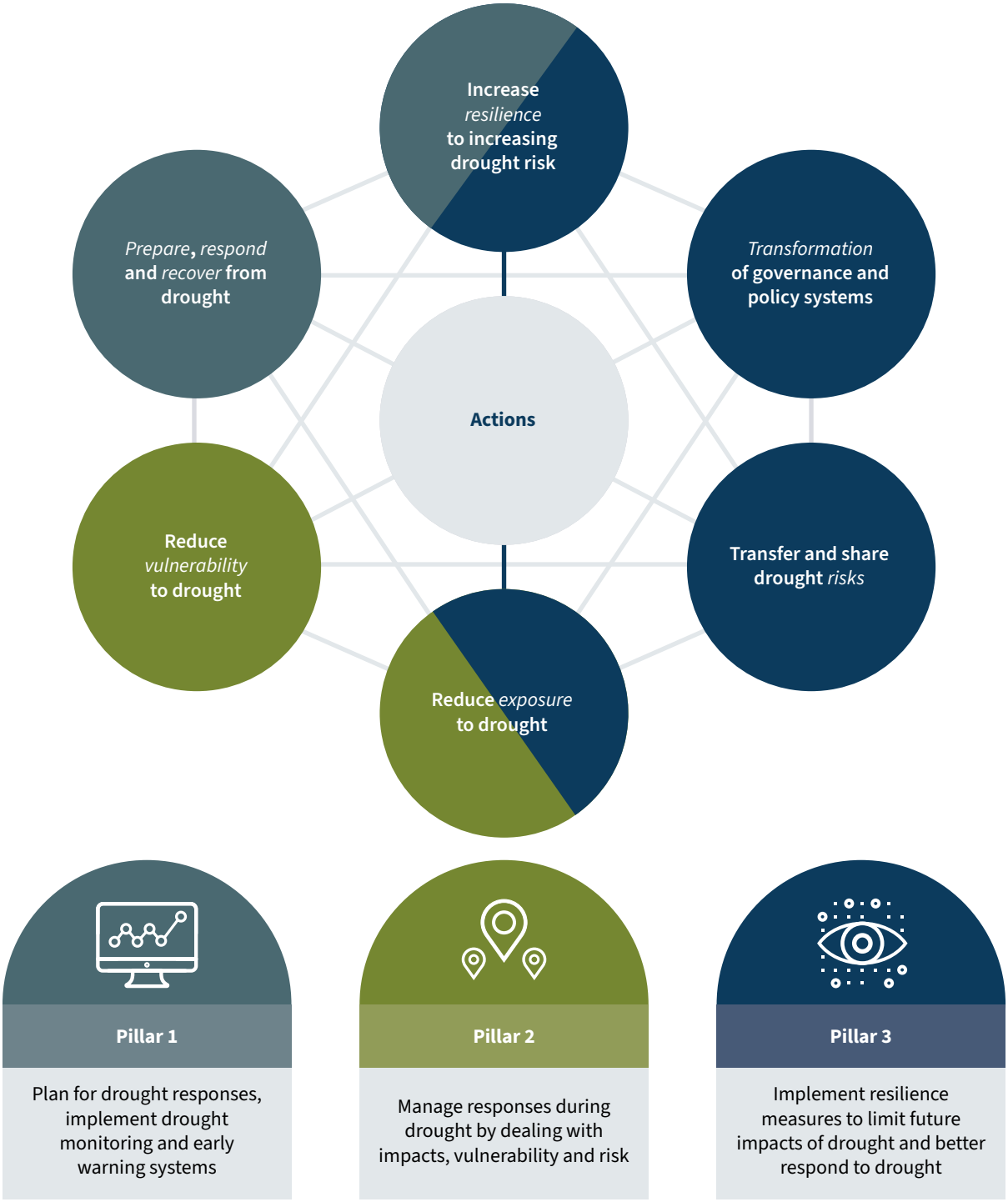
Building drought resilience in our region

Lessons learnt from the past

Through rich discussions with Townsville and Palm Island community leaders, businesses, service providers, and government agencies, as well as research into historical events and experiences, previous learnings were clear and strong. These included:

1. The community, through lived experience, has built a high level of resilience and this needs to be acknowledged and built upon. Place-based and community-led resilience strategies are to be a priority.
2. Resilience skills are transferable and can be applied in numerous contexts. Townsville and Palm Island are regions highly susceptible to disasters such as floods/cyclones so by combining lived experience and planned resilience building strategies the community will be stronger, more prepared, and more able to cope with the impacts of drought.
3. Drought is understood in varied ways and is perceived differently by different cohorts of people depending on their experience and priorities. This requires adaption and customisation when discussing resilience building.
4. Expectation management is important. If we can educate the community about the natural environment and what to expect as the climate changes, they will be more confident in coping. In Townsville, the fear of dry lawns and gardens needs to be addressed and the reality and implications of living in the dry tropics embraced.
5. In the Townsville and Palm Island region, drought is perceived to be a politicised issue, used for political gain at the detriment of the community. It is important this attitude is addressed so there is an understanding everyone has a role to play in drought resilience.
6. Alignment is needed across complex planning strategies of different agencies relating to resilience, disaster management, and economic and social development.
7. Hot and dry weather has a significant impact on the physical health of the community. Systemic and personal strategies to cope with heat waves need to be developed, promoted and adopted.
8. Encouraging mental wellness and supporting mental health is very important. Trauma, be it from personal experience, intergenerational or vicarious is easily triggered by climatic stressors. Both Townsville and Palm Island communities have a history of trauma and mental health needs. Mental health resilience activities need to be proactive and relevant to attract the participation of community members, this includes the use of personal advocates/local champions, services to be inviting and culturally appropriate and taking a positive approach while valuing privacy and confidentiality.
9. Community connectedness on all levels is critical. This includes among residents, between residents and service providers, and integrated planning across agencies.
10. Knowledge is power. Having current, comprehensive information and good communication channels helps to prepare and cope with any natural disaster. The necessary soft and hard infrastructure and the capacity to utilise needs to be made available.
11. Build the capacity of local business owners/managers (including agri-businesses) in areas such as financial skill development, debt management, cash flow planning, succession planning and business collaboration facilitation.
12. A focus needs to be put on regenerative land management and caring for soils and natural vegetation which will require an assessment and adaption of practices.
13. Bushfires are more common during dry times and can cause negative environmental and social impacts, programs encouraging fire planning and fire management practices are important to minimise the potential damage.

Figure 27: Key pillars and actions of the Drought Resilience, Adaptation and Management Policy (DRAMP) framework.[117]



The Regional Strategy

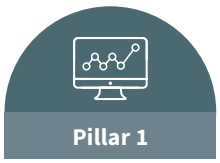
This Regional Drought Resilience Plan is based on six Drought Resilience Pathways identified for the Townsville and Palm Island region.

1. Water Security
2. Resilient Natural Environment
3. Resilient Community
4. Resilient Economy
5. Resilient Infrastructure
6. Regional Drought Governance

Each pathway is detailed though the articulation of:

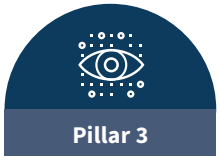
- **A goal** – what drought resilience in this pathway would look like.
- **One or more strategies** – broad bodies of work, or themes uniting the actions.
- **Actions for each strategy** – some of which are for the whole region, while some are applicable only to Townsville or Palm Island.
- Reference to the relevant Drought Resilience, Adaptation and Management Policy (DRAMP) pillars and the Queensland Strategy for Disaster Resilience (QSDR) objectives per strategy.
- Reference to the lessons learned informing this strategy.

Drought Resilience, Adaptation and Management Policy (DRAMP) framework



Plan for drought responses, implement drought monitoring and early warning systems..

Manage responses during drought by dealing with impacts, vulnerability and risk.



Implement resilience measures to limit future impacts of drought and better respond to drought.

Queensland Strategy for Disaster Resilience (QSDR) 2022–2027

Objective 1	We understand the potential disaster risk we face.
Objective 2	We work together to better manage disaster risk.
Objective 3	We seek new opportunities to reduce disaster risk.
Objective 4	We continually improve how we prepare for, respond to and recover from disasters.

Codes

WoR	Whole of Region
Tvl	Townsville
PI	Palm Island

Pathway 1: Water security

Goal

The region has:

- sufficient water supply and storage facilities for its current and future needs, including diverse water sources and supply contingency plans.
- a reliable supply of safe drinking water.
- affordable water for its needs.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P3	2	Facilitate the collaboration of the local governments in North Queensland to develop a cohesive program of works to deliver infrastructure that can achieve whole of region water security and drought resilience.	**WoR** • Brief North Queensland Regional Organisation of Councils (NQROC) on the outcomes of this RDRP and other plans within its footprint. Seek support for whole of region planning and infrastructure funding advocacy.
Supports lesson 2, 5, 6			
P3	1, 3	Develop place-based community education programs encouraging water conservation.	**Tvl** • Continue to support community behaviour change through the Our Water Smart City program.
Supports lesson 1, 3, 4, 10			**PI** • Work with the local community to develop and distribute appropriate water conservation messaging.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P3	3	Implement initiatives to manage the risk of future water supply shortages in the context of increasing demand.	**Tvl** • Ensure water security and contingency supply systems for outlying suburbs and Magnetic island. • Instigate potential options for stronger urban and industrial demand management via auditing current water use. • Negotiate for access to be available to groundwater supplies currently in private hands. • Review the current policy regarding the regulation of access to spring or ground water and the implication it has on the water table and water usage.
Supports lesson 1, 10			**PI** • Seek funding for alternative water sources to provide a reliable consistent supply of water. • Encourage and incentivise water storage at the household and community level. • Support Palm Island Aboriginal Shire Council (PIASC) to monitor and maintain the health of water storage facilities.

Lead institutions

- Department of Local Government, Water and Volunteers
- Townsville City Council
- Palm Island Aboriginal Shire Council
- Townsville Enterprise Ltd.
- Regional Development Australia Townsville North West Qld

Key partners and stakeholders

- North Queensland Water Infrastructure Authority

Investment targets

- National Water Infrastructure Development Fund
- Regional Water Assessments
- Local Government Subsidies and Grants Programs

Economic outcomes

Improved resilience of local economies and businesses to drought impacts.

Environmental outcomes

Protection of key environmental values in the region's water catchments.

Social and cultural outcomes

Protection of cultural values in water.

Governance outcomes

Improved coordination and regional governance for achieving water security.

Pathway 2: Resilient natural environment

Goal

The region has a resilient natural environment characterised by:

Open landscapes

- Supporting biodiversity (plant and animal).
- Managing the risk of uncontrolled fire.
- Focusing on natural systems restorative and sustainable practices.

Community places

- Featuring climatically appropriate vegetation and management practices.
- Demonstrating restorative and sustainable practices.
- Including cool city initiatives.

DRAMP Pillar	QSDR Objec tive	Strategy	Actions
P1 **Supports lesson** 10, 12	1	Understand the natural environment and risks posed by climate change and future dry seasons/droughts.	**WoR** • Carry out a 'stock take' of existing drought monitoring and early warning systems and identify where opportunities exist to improve coverage and uptake. • Work with Natural Resource Management (NRM) bodies to establish appropriate landscape and natural environment vulnerability and risk indicators. • Assess the risk to the Great Barrier Reef Marine Park caused by extra dry seasons on Magnetic Island and Palm island. Develop strategies to mitigate risk to the marine Park and vulnerable species therein.
P3 **Supports lesson** 12, 13	4	Implement strategies to manage drought risks to, and build the resilience of, the region's natural environment.	**WoR** • Support partnerships and initiatives facilitating natural systems integration and restoration. • Facilitate the collaboration of community, natural resource and environmental advocacy groups with local governments to deliver a wholistic approach to the region's environmental resilience. • Support property owners to undertake bushfire planning and implement mitigation strategies. • Support initiatives to build future environmental resilience through the development of biologically active soils. • Support programs focusing on vegetation management planning and encourage best practice land management (including cool burning). • Address biosecurity risks caused by drought mitigation strategies including the importation of vegetation and fodder. • Develop strategies to manage the risk of complacency among the population to counter the "drought free" sentiment is currently pervading the community.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P3	2	Support place-based environmental stewardship.	**WoR** • Support First Nations groups to use traditional knowledge and practices to care for country.
Supports lesson 1, 10, 13			**PI** • Harness and build on-island community capability – including through the Indigenous Rangers program – to use traditional approaches to healing and caring for country. • Support resource environmental groups to undertake communication activities explaining the importance of the natural environment. That is, how local residents can support the conservation of local flora and fauna and improve the islands environmental resilience.
P3	2	Support programs that build resilient community spaces.	**WoR** • Encourage the cultivation of drought-resilient plant species and varieties and promote their use in residential and community spaces.
Supports lesson 4,10			**TvI** • Establish partnerships across the public and private sectors to provide community education regarding liveability expectations and the choice and care of appropriate vegetation. • Encourage the application of cool city principles through regional planning and community education programs.

Lead institutions

- Townsville City Council
- Palm Island Aboriginal Shire Council
- Department of the Environment, Tourism, Science and Innovation
- North Queensland Dry Tropics Natural Resource Management

Key partners and stakeholders

- DNRMMRRD
- Indigenous Ranger groups
- Local Landcare groups
- Landholders
- Rural Fire Service Queensland

Investment targets

- Future Drought Fund
- National Landcare Program
- Community Grants Programs
- Philanthropic support

Economic outcomes

Improved resilience of local economies and businesses to drought impacts.

Environmental outcomes

Protection of key environmental values in the region's catchments.

Social and cultural outcomes

Protection of first nations and contemporary cultural values in the natural environment.

Governance outcomes

Improved coordination and regional governance for achieving water security.

Pathway 3: Resilient community

Goal

The region is characterised by a community that:

- is drought resilience aware and informed, and demonstrates drought resilience practices.
- is connected and supports its members.
- has the human and social capital to deal with drought (including risk literacy).
- has sufficient community support services to build community capacity for resilience.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P1	1	Encourage community members to undertake drought and disaster personal scenario planning.	**WoR** • Include drought preparedness as part of disaster management readiness activities. • Provide information regarding drought awareness and the potential impacts of drought/extended dry seasons to community members in accessible formats. • Promote strategies for reducing heat stress through public health messaging.
Supports lesson 2, 7, 10			
P3	2	Implement initiatives supporting the building of community connections and cohesion.	**WoR** • Seek funding for co-designed community resilience building activities facilitating community connectivity and cohesion from alternative Drought Fund programs. • Support local government events and activities encouraging community connectedness.
Supports lesson 1, 3, 9			**PI** • Support place-based activities and events providing opportunities for community connections to be developed and resilience information to be distributed.
P3	2	Build the community's level of psycho-social resilience.	**WoR** • Connect the not-for-profit service providers (physical health, education, finance and commerce, NRM and mental health) to each other and the community to develop holistic support programs, build the capacity of the organisations and improve service coordination.
Supports lesson 1, 6, 8			**PI** • Increase the scope and availability of community service offerings. • Use a place-based partnership approach to increase the retention and completion of Aboriginal and Torres Strait Islander school students. • Undertake programs building community leadership capacity.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P3	2	Manage the risk to community and civic pride and the maintenance of liveability expectations caused by extended dry periods.	**TvI** • Develop community understanding of the dry tropics landscape, seasonality, implications for living in this area and how to optimise these conditions. • Collaborate with the property industry, large employers and media to educate the community (particularly new residents) on the dry tropics environment and water conservation strategies.
Supports lesson 9, 10			

Lead institutions

- Palm Island Aboriginal Shire Council
- Townsville Enterprise Ltd.
- Primary Health Network
- Selectability
- Palm Island Community Company

Key partners and stakeholders

- Health and social service providers in the region
- Industry bodies
- Community agencies
- Local businesses
- Schools
- Department of Primary Industries
- Queensland Fire Department
- Tropical North Queensland Drought Hub

Investment targets

- Foundation for Rural and Regional Renewal Community Impact Program
- Drought Hardship Grants
- Information, Linkages and Capacity Building (ILC): Economic and Community Participation Program
- Hospital Board and Primary Health Network
- Philanthropic Investors

Economic outcomes

Improved individual, family and business resilience.

Environmental outcomes

Prevention of acute environmental and animal welfare problem arising from distress.

Social and cultural outcomes

Increased social resilience and cohesion.

Governance outcomes

Improved coordination and regional governance for all aspects of drought resilience.

Pathway 4: Resilient economy

Goal

Regional economic stakeholders:

- are aware of, and prepared for, the impact of drought in neighbouring regions.
- demonstrate innovation in the use of water.
- have business contingency plans demonstrating risk literacy and drought and disaster preparedness.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P1 **Supports lesson** 10, 11	1, 4	Understand the potential impacts of drought on the regional economy and develop risk mitigation strategies.	**Tvl** • Undertake an analysis of the impact of recent droughts on the Townsville economy and the regional workforce. • Use the above to inform the development and implementation of risk mitigation strategies. • Work with local small – medium business and business support groups to implement business resilience strategies and community/environmental education.
P3 **Supports lesson** 1, 3, 10, 11	2,3	Strengthen and diversify the regional economy to withstand the impacts of drought.	**WoR** • Provide training and materials to support small businesses to undertake drought (and associated hazards) risk management and business continuity planning.
			Tvl • Enable broad and coordinated strategies to support the strengthening of agricultural business efficiency, cost reduction, resilience planning, action and adoption of innovation. • Capitalise on innovation and technology opportunities to support economic diversification. • Consider the implications of new business and industry on the demand for, and affordability of, water in regional planning.
			PI • Co-design an appropriate social enterprise model to foster the emergence of First Nations-led businesses and social enterprises.

Lead institutions

- Department of Local Government, Water and Volunteers
- RDA Townsville and North West Qld
- Townsville Enterprise
- Department of Primary Industries
- Department of State Development, Infrastructure and Planning
- Industry Bodies
- Tropical North Queensland Drought Hub
- Sunwater

Key partners and stakeholders

- Department of Trade, Employment and Training
- Smart Precinct
- Townsville Chamber of Commerce

Investment targets

- Building Better Regions Fund
- Drought and Climate Adaptation Program
- Climate Solutions Fund
- Queensland Rural and Industry Development Authority and Future Drought Fund
- Advance Queensland Regional Collaboration Grants
- Industry Partnership Program
- National Indigenous Australians Agency
- National Water Grid Fund
- Entrepreneurs and investors

Economic outcomes

Improved resilience of local economies and businesses to drought impacts.

Environmental outcomes

More efficient use of water and natural resources within businesses.

Social and cultural outcomes

Increased social resilience and cohesion within our communities.

Governance outcomes

Improved drought support coordination and regional governance for drought resilience.

Image: Bushland near Arcadia on Magnetic Island. *Source: iStock.*

Pathway 5: Resilient infrastructure

Goal

The region has:

- infrastructure facilitating drought resilience.
- urban design supporting hot and dry conditions.
- water sensitive design and innovation.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P2 **Supports lesson** 2, 3, 6	1, 4	Ensure key regional infrastructure is appropriate and fit-for-purpose in times of drought or an extended dry season.	**WoR** • Regularly audit the condition of existing infrastructure supporting drought resilience and ensure asset management plans are current and acknowledge future contexts. • Undertake long term planning and advocacy to ensure adequate resources are available to build and maintain essential infrastructure.
			PI • Provide financial assistance and management support to progressively upgrade essential infrastructure on Palm Island, including but not limited to water, waste, transport and community infrastructure. • Promote water sensitive design and cool building principles in all new construction projects.
			TVL • Encourage climate suitable housing through planning processes and relationships with developers and the construction industry. • Promote water sensitive design and cool building principles in public infrastructure projects and commercial and residential contexts.
P3 **Supports lesson** 9	3	Facilitate access to appropriate digital infrastructure across the region.	**WoR** • Identify and address digital technology infrastructure challenges for innovation, community connectivity, and industry development. • Develop proposals and advocate for multi-stakeholder investment in technological innovation supporting community and economic drought resilience.

Lead institutions

- Department of Local Government, Water and Volunteers
- Townsville City Council
- Palm Island Aboriginal Shire Council
- Townsville Enterprise Ltd.
- Department of State Development, Infrastructure and Planning
- Department of Housing and Public Works

Key partners and stakeholders

- National Water Grid Authority

Investment targets

- National Water Grid Fund
- Department of Climate Change, Energy, the Environment and Water
- Regional Water Assessments
- Local Government Subsidies and Grants Programs
- NBN Co

Economic outcomes

Improved resilience of local infrastructure to drought impacts.

Environmental outcomes

Protection of key environmental values in the region's water catchments.

Social and cultural outcomes

Protection of cultural values in water.

Governance outcomes

Improved coordination and regional governance for achieving water security.

Image: Townsville, North Queensland.

Pathway 6: Strong regional governance

Goal

The region has:

- an effective framework building capacity and facilitating coordination of drought resilience partners to plan, deliver and monitor drought resilience.

DRAMP Pillar	QSDR Objective	Strategy	Actions
P1 P2 P3 **Supports lesson** 6	2	Establish an interregional approach (Herbert and Burdekin water plan areas) to manage drought resilience using cohesive and coordinated approaches with key stakeholders. This includes local governments, NRM bodies, industry bodies, education providers, state and Australian government departments and agencies, and regional economic organisations.	**WoR** • Through the Drought Hub, facilitate convening key stakeholders in drought resilience planning across the Herbert and Burdekin water plan areas. Develop an understanding of, and the strategies for, addressing opportunities created through a collaborative approach. • Understand the capacity and assets of partners, and the linkages between partners which can support action implementation. • Review the RDRP MEL and determine a detailed MEL subplan for each strategy / action as part of its implementation.
P1 **Supports lesson** 2	3, 4	Build local drought governance capacity.	**WoR** • Through the provision of training, mentoring and resources, increase local capacity for effective interpretation and usage of drought monitoring, early warning, and short time forecasting products. • Support TCC and PIASC to include drought in their Disaster Management and Recovery/Resilience Planning and activities. • Seek financial support to employ a resource to coordinate the implementation and monitoring of Townsville and Palm Island Regional Drought Resilience Planning. • Work with BoM to develop anticipatory capacity, data and knowledge systems, and resources for drought resilience. • Secure the commitment of RDRP partners to lead implementation of this plan and engage in an ongoing management group.

Lead institutions

- Townsville City Council
- Palm Island Aboriginal Shire Council
- TNQ Drought Hub
- Regional Economies Centre of Excellence
- North Queensland Dry Tropics
- Department of Primary Industries
- Regional Development Australia Townsville and North West Queensland

Key partners and stakeholders

- Local Drought Committees
- Queensland Reconstruction Authority
- Queensland Fire Department

Investment targets

- Future Drought Fund
- Local Governments and Department of Local Government, Water and Volunteers

Economic outcomes

Early action to reduce the economic impacts of drought.

Environmental outcomes

Prevention of acute environmental and animal welfare issues arising from drought onset.

Social and cultural outcomes

Increased social resilience and cohesion across the drought governance system.

Governance outcomes

Improved coordination and regional governance for drought resilience.

Image: Floodplain, Townsville

Community partnerships and communication strategy

Building local priorities and action initiatives

This Regional Drought Resilience Plan (RDR Plan) is focused on developing the broader regional strategies required at the whole of region scale. This is needed to structure and enable local scale responses to these issues in:

1. local community/suburbia (e.g. Magnetic Island, Palm Island, Rollingstone, Bluewater)
2. property or enterprise
3. First Nations, community and business.

As a regional plan, this process has not been sufficiently resourced or programmed to develop detailed local drought responses at these scales, but this effort is progressing well in the context of the QRA Resilience Strategy process. The region is well positioned to progress support for the resolution of regional plan priorities at those scales. Partnerships between the public sector, private enterprise and the community are required to fund specific outcomes.

The following details how the regional strategies are outlined, which will enable the progression of local priorities into action.

Translating regional strategies into local community action

As outlined in the regional strategy, this plan mobilises localised strategic action by relevant stakeholders on several key “whole of region” important issues to build drought resilience.

Translating regional priorities into local level actions

There are three key mechanisms for supporting the translation of regional priorities for action to improving drought resilience at a local level. These are:

1. Business and property level actions: Supporting business/property scale drought resilience planning.
2. Place-based actions: Within overarching regional drought resilience planning, ensuring differentiated local drought resilience actions considering specific nuances of place-based or community characteristics and needs.
3. Cascading risk and vulnerability actions: Regional drought strategies focusing on exposing and addressing cascading risk and vulnerability at a local level, and working with critical stakeholders for a coordinated approach to mitigating vulnerability and risk. This will involve appropriate data and evidence at the granular level to inform sustainable decision making.
4. Local network development actions: Strengthening local networks for drought resilience including connectivity, information sharing, and social capital building.

Together, the above regional approaches will deliver local action to secure regional drought resilience.

The core approach for implementation of this RDR Plan is based on the emergence and continued growth of several layers of partnership, ensuring a firm and continuing commitment to achieving impact. At the centre of these arrangements sit the commitment of several key regional partners to act as the long-standing owners of the RDR Plan. There are three layers of partnership important in mobilising these arrangements.

Local Government partnership

A strong partnership between Palm Island Aboriginal Shire Council and Townsville City Council is required for an effective regional approach, including partnerships with neighbouring councils who face similar drought issues.

This partnership is at the core of driving the regional drought resilience planning and action – bringing together key stakeholders and aligning drought planning to other initiatives in the region and LGA. Resourcing both councils to have capacity to lead drought resilience actions will be a critical aspect in the implementation of regional drought resilience plans.

Image: Cape Pallarenda Conservation Park. *Source: iStock*

Partnerships among key regional institutions

Active coordination in drought resilience strategy development and delivery is building through cooperation across several key regional institutions who will partner with Palm Island Aboriginal Shire Council and Townsville City Council in supporting strategy implementation. These include, but are not limited to, the following key institutions:

Local government communities and the region's land holders and businesses are the key players most directly affected by drought and water shortage. Raising capacity of both councils and the region's regional NRM body is crucial to ensure RDR Plan delivery. NQ Dry Tropics is an NRM body that has aligned interests, particularly working toward addressing relevant environmental challenges including livelihoods, sustainable agriculture, effective natural resource use (including water) and are committed to landholders leading change. The TNQ Drought Hub is hosted by James Cook University and can be a source of partnerships, particularly around agricultural technologies and innovation. The regional development and economic/industry bodies have aligned strategies to the drought resilience regional plan priority areas and are integral to coordinated action.

As the key DPI-sponsored drought resilience planning agency, the Rural Economies Centre of Excellence (RECoE), with its local linkages and presence provides the overall planning support and additional facilitation support to ensure partnerships continue.

Partnerships with key federal and state agencies

Federal and state agencies are critical to progressing policy and bilateral budgetary and program solutions to the long-term drought related issues facing the region. Combined federal interest in broader resilience building (both drought, flood, and other natural disasters) is led through the new Australian Government Recovery and Resilience Agency. This agency leads Australian responses to natural disasters and holds responsibility for dispersal of the Future Drought Fund. Other key Australian Government agencies that need to be drawn into this response include the National Water Grid Authority; Department of Agriculture, Fisheries and Forestry; Department of Climate Change, Energy, the Environment and Water, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, and Austrade.

At the state government level, both councils have strong relationships with QRA and Queensland Fire Department (QFD) and are collaborating to build and implement the region's broad Resilience Strategy. However, the region's capacity to drive these partnerships is funding dependent. Queensland's DPI as the Queensland lead on drought response and recovery, will need to increasingly partner the region in supporting responses to, and long-term monitoring of, this RDR Plan. Other key Queensland government agencies that need to be drawn into this response include the Department of Local Government, Water and Volunteers; Department of State Development, Infrastructure and Planning; Department of Trade, Employment and Training; Department of the Environment, Tourism, Science and Innovation; Department of Transport and Main Roads; Department of Housing and Public Works.

Image: Ferry landing at Palm Island. *Source: SeaLink.*

Monitoring, evaluation and learning (MEL)

The Future Drought Fund (FDF) represents the Australian Government's ongoing commitment to strengthen drought preparedness and resilience. Development and publication of Regional Drought Resilience Plans (such as this one) aim to identify and guide actions to build the region's resilience to future droughts. The overall benefits of regional planning are aimed to:

- empower communities to identify the impacts of drought and develop regional drought resilience and response management plans.
- support communities to consider the incremental, transitional, and transformational opportunities needed.
- strengthen drought resilience and encourage innovative initiatives at the regional level.
- facilitate increased community understanding of their resilience to drought, including encouraging communities to share their learnings with each other.
- encourage improved natural resource management capability through planning.

Theory of Change

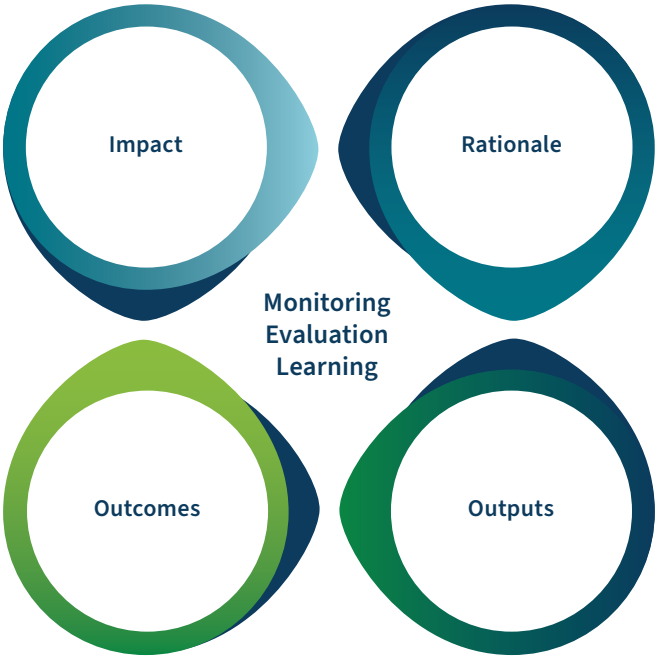
The core underpinning our rationale is that building regional resilience will improve capacities to respond and adapt to the impact of drought. Resilience is a multifaceted concept involving a range of views combining resistance in the face of adversity, rebounding and transformation[118]. Three common conceptualisations of resilience include an engineering resilience return to a point of stability following a disturbing event[119]; the amount of disturbance a system can absorb before changing to another stable state of equilibrium[120]; and a characteristic allowing members to thrive in an environment characterised by change, uncertainty, unpredictability, and surprise[121]. The theory of change adopted for this project incorporates dimensions of the wider context for drought and increased community capacity for planning and transformation in the face of drought. Drought resilience is more than susceptibility and vulnerability[122]. Resilience thinking addresses the dynamics and development of complex social–ecological systems[123]. Our theory of change commences with consideration of the wider context and addresses social and economic resilience as well as the resilience of agricultural and environmental systems.

Overall program outcomes

While our pathways and strategies are derived from the above theory of change, the Townsville and Palm Island RDR Plan sets the quadruple-bottom line regional outcomes intended from these, including economic, environmental, social and governance and cultural outcomes (Figure 29).

Figure 28: Approaches to Monitoring, Evaluation and Learning (MEL).[124]

Impact
What signs of progress are there towards long-term drought resilience? What priorities and opportunities do the Fund and programs reveal for drought resilience policy, funding and programs?



Appropriateness
To what extent are the programs aligned with the strategic objectives of the Fund, and targeted at important needs? What can be done to improve the appropriateness of the investments?

Effectiveness
To what extent are programs achieving their intended outcomes (and any unintended outcomes)? What could be done to improve the outcomes of the investments?

Efficiency
To what extent are the Fund and program outputs being administered and delivered efficiently, and to the expected quality? What can be done to improve efficiency of the investments?

Figure 29: Dimensions of RDRP program outcomes.[125]

Economic
Reduced economic cost arising from drought.

Environment
Reduced environmental decline emerging from drought.

Social and governance
Increased general community health as a key resilience factor.

Cultural
Greater integration of cultural considerations in planning/delivery.

Program logic

The program logic of the RDR Plan identifies the outcomes from each of the activities in the Plan, based on the theory of change and overall program outcomes.

MEL data collection methods

Data will be collected at established points in implementation of the RDR Plan. Collecting and collating data will interweave collaborative planning meetings, ongoing desk top analysis, review of existing data, surveys, interviews and focus groups, and case studies. The data collection process will balance qualitative and quantitative methods to enable deep data capture change and overall program outcomes.

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