



CRC for
Water Sensitive Cities

Enabling water sensitive greenfield development in Townsville

IRP3: Guiding integrated urban and water planning



Australian Government
Department of Industry, Science,
Energy and Resources

Business
Cooperative Research
Centres Program

Enabling water sensitive greenfield development in Townsville

Guiding integrated urban and water planning (IRP3)

IRP3-3-2020

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Publisher

Cooperative Research Centre for Water Sensitive Cities
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w. www.watersensitivecities.org.au

Date of publication: July 2020

An appropriate citation for this document is:

Tawfik, S. Smith, B., and Chesterfield, C. (2020). *Enabling water sensitive greenfield development in Townsville*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

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List of abbreviations

ABS	– Australian Bureau of Statistics
CBD	– Central business district
CTH	– Commonwealth
CSBMP	– Conceptual site-based stormwater management plan
CRCWSC	– Cooperative Research Centre for Water Sensitive Cities
DA	– Development assessment
DNRME	– Department of Natural Resources, Mines and Energy
DSDMIP	– Department of State Development, Manufacturing, Infrastructure and Planning
DSS	– Development services schemes
EP Act	– <i>Environmental Protection Act 1994 (Qld)</i>
EPP (Water and Wetland Biodiversity)	– Environmental Protection (Water and Wetland Biodiversity) Policy 2019
EV	– Environmental value
GBR	– Great Barrier Reef
GBRMPA	– Great Barrier Reef Marine Park Authority
IRP3	– Integrated Research Project 3
IWM	– Integrated water management
IWSS	– Integrated water supply strategy
LGIP	– Local government infrastructure plan
LPS	– Local planning scheme
MEDQ	– Minister for Economic Development Queensland
MOUA	– Museum of Underwater Art
NQRP	– North Queensland Regional Plan
PDA	– Priority Development Area
Planning Act	– <i>Planning Act 2016 (Qld)</i>
PSP	– Planning scheme policy
Ports Act	– <i>Sustainable Ports Development Act 2015 (Qld)</i>
QGSO	– Queensland Government Statistician's Office
QLD	– Queensland
QDC	– Queensland Development Code
SBMP	– Site-based stormwater management plan
SDAP	– State Development Assessment Provisions
SPP	– State Planning Policy
TCC	– Townsville City Council
TLPI	– Temporary local planning instrument
UNESCO	– United Nations Educational, Scientific and Cultural Organisation
VTs	– Vision and Transition Strategy for a Water Sensitive Townsville
Water Act	– <i>Water Act 2000 (Qld)</i>
WQO	– Water quality objective
WSC	– Water sensitive cities
WSUD	– Water sensitive urban design
WSSR Act	– <i>Water Supply (Safety and Reliability) Act 2008 (Qld)</i>

Executive summary

Over the next 20 years and beyond, Townsville will face a number of water-related challenges and opportunities that provide impetus for a new approach to urban planning. A collaboration between the CRC for Water Sensitive Cities (CRCWSC) and Townsville City Council (TCC) has elevated the profile of water through the development of the *Vision and Transition Strategy for a Water Sensitive Townsville* (Hammer et al., 2018). The strategy recognises that water plays a pivotal role in protecting the way of life that the people of Townsville value. Past research suggests Townsville has generated strong momentum towards achieving its vision of a future water sensitive city, but is at risk of stagnation if critical enabling conditions are not established. Progressing the transition will require a strategic focus on overcoming the barriers to on-ground delivery, particularly those created by current regulatory frameworks and institutional arrangements that can impede water sensitive approaches.

This report picks up where the *Vision and Transition Strategy for a Water Sensitive Townsville* left off. TCC recognised that to advance towards their vision of a water sensitive Townsville, further attention needs to be given to institutional arrangements, particularly planning and service delivery functions, which can impede water sensitive urban development practices. Accordingly, the Townsville action learning partnership was established in July 2019 between the CRCWSC and TCC to focus on the systems governing urban growth. It explored a range of ideas to redefine what good urban development in Townsville could look like, when considered with water management in mind. These ideas are documented in the companion report, *Ideas for Townsville: Greening the public realm in a dry tropics city* (CRCWSC, 2020).

Our analysis suggests effectively enabling water sensitive urban development in Townsville will require a multi-pronged program of intervention across organisational and institutional environments. Implementing a water sensitive vision for Townsville will require strengthening of both corporate positioning and planning instruments, along with organisational commitment to uphold policy positions to guide future planning and contextually appropriate urban development. A supportive organisational culture that embraces innovation and encourages continuous learning will be important. Similarly, efforts should be directed towards connecting individuals across organisational silos and equipping them with the understanding, skills and tools that enable them to successfully operationalise water sensitive principles.

Drawing on insights from practitioner interviews and workshops, academic research and publicly available documents, this report identifies 14 opportunities to strengthen Townsville's planning and governance systems to advance its water sensitive agenda (listed below). The opportunities present three interrelated levels or pathways for implementation: strategic leadership at the state and local levels, urban planning at the local level via the Townsville City Plan, and Council functions at the operational level.

Implementing these opportunities would strengthen Townsville's identity as a thriving and attractive regional centre uniquely adapted to its dry tropical environment adjacent to the Great Barrier Reef. Townsville's political and institutional leaders have the opportunity to steer a more water-centric, place-based, urban planning agenda. This requires a clear line of sight from strategy through to policy and implementation.

The ongoing reviews of the Townsville City Plan and other strategic planning documents provide a window of opportunity for TCC to reflect on and reconsider current functions, instruments and processes. The recently established cross-council water sensitive cities (WSC) working group provides a critical platform for exploring and advancing the opportunities identified in this document. The breadth and seniority of its members suggests the working group is uniquely placed to promote a whole-of-council Water Sensitive Townsville agenda through strategic engagement with internal and external stakeholders relating to the three implementation pathways.

Pathway for implementation	Opportunities
<p>Strategic leadership – Prioritising water: Clear state water directives are established and defined for implementation at the local level. A Water Sensitive Townsville agenda is embedded through a water-centric city vision, long-term policy priorities, water pricing strategy and TCC leadership in dry tropics water sensitive urban design (WSUD).</p>	<ol style="list-style-type: none"> 1. Create and adopt a city vision that recognises water as a fundamental pillar of Townsville's current and future identity, through the full or partial adoption of the <i>Vision and Transition Strategy for a Water Sensitive Townsville</i>. 2. Undertake gap analysis and review of water related State Planning Policy to identify misalignment of water policy directives at regional and local spatial scales. 3. Establish clear prioritisation of long-term objectives to achieve the adopted vision for Townsville and ensure council decision making is consistent, transparent and holistic. 4. Develop a water pricing strategy that explores alternative pricing options and pathways that are appropriate for Townsville. Ensure community engagement and education programs are included in pricing reform packages, along with state-level support. 5. Champion the development of local WSUD solutions for the dry tropics by supporting ongoing research, becoming a knowledge broker, and leading by example.
<p>Planning – Streamlining decision making: Water provisions in the City Plan are expanded and elevated by including integrated water management (IWM) outcomes, locally specific design policy, and water quality offsets schemes. Corridor planning is undertaken for growth areas to streamline decision making and infrastructure delivery. The planning scheme adopts prescriptive IWM provisions to enable consistent, cost-effective and innovative outcomes. Planning scheme policy amendment processes facilitate timely revisions to design and construction standards.</p>	<ol style="list-style-type: none"> 6. Expand WSUD provisions to incorporate IWM outcomes. 7. Incorporate prescriptive planning provisions for IWM to streamline decision making and achieve consistent water and infrastructure assets. 8. Facilitate corridor planning across the three growth areas to integrate green/blue corridors and grey infrastructure, and facilitate IWM in a cost-efficient and resilient manner. 9. Implement a water quality offsets scheme to support cost efficiencies in infrastructure delivery and asset management. Consider piloting a small-scale water quality offsets scheme before rolling out across the local government area. 10. Implement locally specific housing design by developing fit-for-purpose design policy (TDesign) within the City Plan. Collaborate with the development industry to pilot projects that demonstrate TDesign principles. 11. Streamline amendment processes for design and construction standards within the City Plan to facilitate timely and flexible revisions as understandings and practices evolve.
<p>Operations – Optimising functions: TCC functions as a truly integrated entity through coordinated activity that bridges traditional silos and fosters collaboration, supported by committed leadership.</p>	<ol style="list-style-type: none"> 12. Adopt an integrated focus to planning and delivering long-term, strategic water outcomes. 13. Trial collaborative mechanisms to bridge silos and support integrated urban and water planning. 14. Implement a program of organisational cultural change, guided by TCC leadership and tied to broader activity focused on institutional capacity building.

1 Introduction

Townsville aspires to become an attractive, liveable city with empowered citizens that embrace their dry tropical identity. This vision requires resilient water systems able to provide essential services (i.e. water supply, flood management and drainage), as well as support healthy environments, maintain green parks and gardens, and promote urban cooling. However, contemporary pressures associated with a growing population, urbanisation and a changing climate are expected to place an increasing strain on existing water systems and services.

While it has been recognised that different land use planning responses are required to adequately address these challenges, on-ground practices to date still largely reflect a 'business as usual' approach to urban development. The business as usual approach—involving mostly greenfield urban growth and conventional 'single dwelling on a lot' built form—increases pollutant loads to surrounding environments, compromising the health of Townsville's inland waterways and fragile coastal marine environments.

Realising Townsville's long-term aspirations—for an attractive, liveable city that promotes the health and prosperity of its citizens, without compromising the natural environment—will require integrated approaches to urban planning that promote cross-sectoral collaboration and recognise the interlinkages between water and urban systems. Developing an integrated planning approach that recognises and strengthens these linkages is the key focus of Integrated Research Project 3 (IRP3).

1.1 IRP3: Guiding Integrated Urban and Water Planning

The Cooperative Research Centre for Water Sensitive Cities' (CRCWSC) IRP3 *Guiding Integrated Urban and Water Planning* recognises that achieving innovative, water sensitive outcomes requires an integrated approach to land use and water planning processes. Through an action research approach, the project explores how different types of urban development can be deliberately guided, at a range of planning scales, to achieve water sensitive outcomes.

The conceptual basis of this project is depicted below (Figure 1) as an 'integrated urban and water planning' framework, made up of five distinct phases, underpinned by a collaborative planning process. The framework guides stakeholders to consider a range of development scenarios and water sensitive servicing options, collectively evaluate preferred options, and identify the financing, planning and governance mechanisms required to deliver desired outcomes. The phases are represented sequentially, but the planning process may not be strictly linear. Phases will overlap and often be highly iterative. Each phase can be characterised by different levels of practice. More ambitious aspirations for water sensitivity in urban development are likely to require higher levels of practice to be successfully realised. These higher levels of practice will involve increased integration (across actors, sectors and disciplines), complexity, formality, scale of activities and resources.

The project team is currently working with government and industry stakeholders on real-world projects across Australia to develop and apply a new framework for integrated urban and water planning. Townsville is one of several case studies that will be explored by IRP3. An action learning partnership was established in July 2019 between the CRCWSC and Townsville City Council (TCC) to help deliver water sensitive development and servicing outcomes.



Figure 1. Integrated Urban and Water Planning framework

1.2 Townsville action learning partnership

Towards the end of 2017, the CRCWSC worked with TCC to develop a water sensitive vision and transition strategy for Townsville (see Hammer et al., 2018). Through a series of facilitated workshops, leading thinkers across water, planning, environment and development in Townsville collectively articulated the long-term water aspirations for the city, benchmarked current performance and identified short- to medium-term strategic priorities for action.

The vision for Townsville as a future water sensitive city depicts the values and outcomes to be secured over the next 50 years: *Townsville is an attractive, resilient city that manages water to enhance healthy ecosystems, embrace dramatic natural water cycles, drive world-leading innovation, and support citizens who are proud of their dry tropical identity.*

TCC recognised that to advance towards their vision of a water sensitive Townsville, further attention needs to be given to institutional arrangements, particularly planning and service delivery functions, which can pose a barrier to innovative practices and alternative servicing approaches. Accordingly, the Townsville action learning partnership was established in July 2019 between the CRCWSC and TCC. The collaborative partnership explored the institutional challenges limiting water sensitive outcomes.

A three-stage program of activity (Figure 2) was proposed to enable productive interactions among stakeholders to collectively unpack and resolve key urban and water planning challenges. By engaging with key government and industry stakeholders, the program sought to:

- **identify and resolve current policy constraints** to delivering innovative development or servicing outcomes
- encourage stakeholders to **cooperatively plan, assess and approve innovative approaches** for delivering water sensitive communities, and
- identify **pathways for implementing innovative solutions** through planning, regulatory and asset management systems.

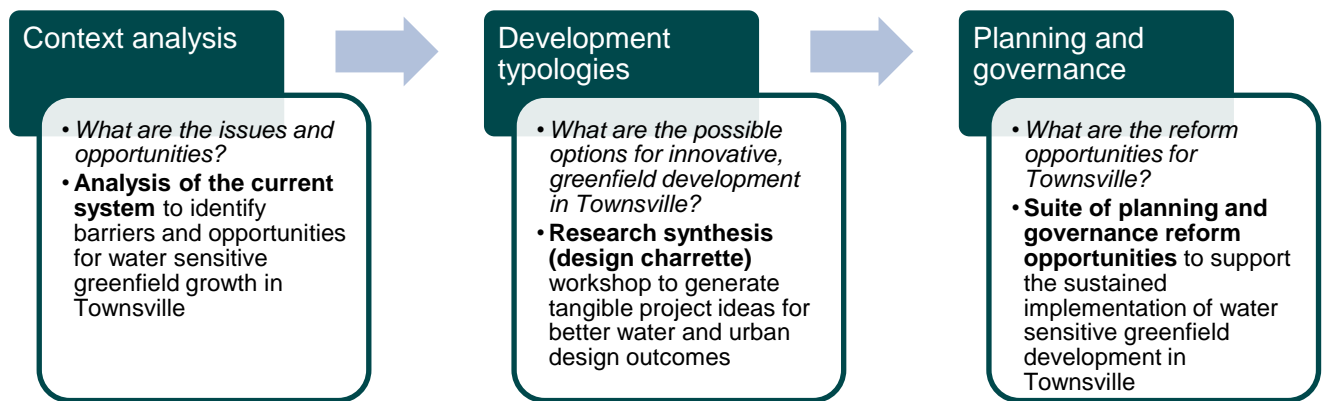


Figure 2. Townsville case study research program

1.3 About this report

This report documents the outputs of the first and final stages of the Townsville case study research program. It identifies the barriers to water sensitive development and opportunities for creating a more enabling environment through changes to planning and governance systems. Our analysis draws on insights from practitioner interviews (15 interviews with 16 practitioners within and external to TCC), supplemented with academic research and secondary data sources.

The outputs of the second stage of the research program are documented in a companion report, *Ideas for Townsville: Greening the public realm in a dry tropics city* (CRCWSC, 2020). That report synthesises the ideas generated by workshop participants on 8 October 2019. The workshop redefined what good urban development in Townsville could look like, when considered with water management in mind. It was attended by 27 representatives from government, industry and research. Participants explored ideas to create an urban forest, and thereby enhance the water sensitivity and liveability of greenfield growth in Townsville.

This report aims to understand and improve the enabling context for implementing these ideas. The report provides an overview of the current system context shaping Townsville's urban growth, based on an extensive review of relevant planning documents, datasets and reports at the local, state and federal levels. After outlining current and future trends affecting growth in Townsville (Section 2), the report describes Queensland's planning framework, focusing on the instruments at the state, regional and local levels that influence land use, urban development, water servicing and environmental outcomes in Townsville (Section 3).

The report then delves into issues and opportunities for advancing Townsville's water sensitive agenda. Section 4 explores specific barriers and related opportunities at three interrelated scales of practice: strategic leadership at the state and local levels, urban planning at the local level via the Townsville City Plan, and council functions at the operational level. Each opportunity seeks to create a more enabling environment by changing key planning, governance and service delivery mechanisms. These opportunities were tested and further refined with practitioners on 26 February 2020, with key implications for implementation articulated in the final section of this report.

The thinking outlined in this document was developed as part of a research process and has no organisational commitment or status in government decision making. The discussion is intended to seed the development of intra-organisational policies, strategies and procedures. Further analysis and evaluation will be required before any action is taken relating to the opportunities.

2 Transitioning to a water sensitive Townsville

2.1 Current context

Townsville is located about halfway between the tip of Cape York and Brisbane, in the dry tropics of north-east Queensland (Figure 3). Founded in 1864 as a port for the fledgling pastoral industry in North Queensland, the city has grown to be the largest city in northern Australia, serving as an economic anchor to surrounding mining and agricultural regions and Australia's entry point to Asia. Notably, over 74% of trade through the Port of Townsville is with Asian markets, making it one of Australia's most Asian-oriented trading ports (Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP), 2020). This strategic role of a gateway city has made Townsville the unofficial capital of North Queensland. As such, Townsville provides an important administrative and services hub, with key state and federal government agencies and major business offices centred in the region, along with a number of research institutions such as James Cook University, Central Queensland University, the Australian Institute of Marine Science, and the Great Barrier Reef Marine Park Authority.

Townsville is on the cusp of significant change. It is the largest city in Queensland outside the south-east with a population of 192,058 in 2016, set to grow between 253,722 and 313,315 by 2041 (Queensland Government Statistician's Office (QGSO), 2018a). Over the past decade, growth has slowed since the economic downturn brought about by the end of the mining boom, the Storm Financial collapse, the Palmer Nickel and Cobalt Refinery closure at Yabulu, and large retrenchments from Telstra, Ergon and Queensland Health. Recent efforts to stimulate the economy have been driven by federal, state and local investments in large-scale infrastructure projects, such as the \$250 million Queensland Country Bank Stadium, the Townsville State Development Area, and a number of transformative masterplans under TCC's *Townsville2020* plan.

Waterways and natural areas also underpin Townsville's unique identity, and provide the basis for its economic prosperity. It is a land of extremes—droughts and cyclones are regular occurrences that locals have become accustomed to. The area also supports a rich biodiversity, functioning as a bioregional junction for the Wet Tropics, Brigalow Belt and Einsleigh Uplands bioregions. It includes the UNESCO World Heritage-listed Great Barrier Reef and Wet Tropics and the Ramsar-listed Bowling Green Bay wetlands. These natural assets, and others such as Mount Stuart, the Paluma Range, Castle Hill, Cape Pallarenda, Cleveland Bay, the Strand, Magnetic Island and Ross River, play a key role in creating Townsville's dry tropical lifestyle that locals and visitors value.

2.1.1 Socio-economic and urban profile

Townsville's demographic profile is comparable to Brisbane's, but with some key differences associated with its standing as a regional centre. According to the latest region summary, Townsville's resident population was 194,072 at 30 June 2018 (Australian Bureau of Statistics (ABS), 2019a). The working age population (aged



Figure 3. Townsville area map (Source: [OnTheWorldMap.](#))

15–64) make up the largest segment (68% at 30 June 2017), followed by children (aged 0–14) (20% at 30 June 2017) and seniors (over 65) (12% at 30 June 2017) (ABS, 2019a). This age structure is very similar to Brisbane's (70% working age, 18% children and 12% seniors) (ABS, 2019b).

The majority of Townsville's population was born in Australia (86% in 2016) (ABS, 2019a), compared with 69% in Brisbane (ABS, 2019b). Townsville has a strong and proud indigenous history with approximately 7% of the population recognising themselves as Aboriginal or Torres Strait Islander (ABS, 2019a), compared with 1.5% in Brisbane (ABS, 2019b). The Wulgurukaba, Bindal, Nywaigi and Gugu Badhun Peoples are recognised as the traditional owners and custodians of the land in the Townsville region. The Bindal call the country 'Thul Garrie Waja' and the Wulgurukaba (meaning 'canoe people') call their country 'Gurrumbilbarra'.

Most employed people in Townsville work in health care and social assistance (14.6%), followed by public administration and safety (13.7%) (ABS, 2019a). The latter reflects the large Australian Defence Force community in Townsville, due to the Army and Air Force bases located in the region (the largest defence base in the country). The unemployment rate in Townsville is higher than Brisbane's and the national average, at 8.9% in 2016 (ABS, 2019a) compared with 6.8% and 6.9% respectively (ABS, 2019b). This reflects the recent economic downturn in Townsville, along with the dropping number of businesses across multiple industries since 2013, with notable reductions in construction and retail trade. The consequences of the end of the mining boom are also evident in Townsville's property market. House values have yet to recover since the market collapsed in 2008, with a recent article suggesting that prices have fallen 27.6% since the peak of the property boom in 2007 (Horn, 2019).

The Townsville central business district's (CBD) role as the region's primary activity centre declined in the early 2000s, particularly for retail as other competing suburban centres emerged (such as Aitkenvale, Thuringowa Central, Hyde Park/Townsville West) (Department of Transport and Main Roads, 2011). The declaration of the Townsville City Waterfront Priority Development Area (PDA) in 2014 and the adoption of the Townsville City Waterfront PDA Development Scheme in 2015 seek to reverse this trend by revitalising the city centre (Department of Infrastructure, Local Government and Planning, 2015). Over the next 15–20 years, the Waterfront project will transform the city centre so that it supports a variety of recreation, culture, tourism and high-density urban living uses. Current projects within the PDA, particularly the Queensland Country Bank Stadium (completed in early 2020), will help activate further investment and development opportunities within the area.

Townsville's population density varies significantly to Brisbane, with an average of 52 persons per km² in Townsville (ABS, 2019a) compared with 917 persons per km² in Brisbane (ABS, 2019b). This variance in density is also reflected in the nature of dwelling structures. Most people in Townsville live in separate houses (81% in 2016), with apartments comprising only 7.4% of total occupied private dwellings (ABS, 2019a). Current residential development is concentrated in the city's north and west. The Northern Beaches growth corridor, for example, is anticipated to accommodate significant growth over the next decade due to its proximity to valued amenities such as extensive walking and cycling trails, parks and open space networks, schools, shopping and recreation (McCabe, 2014). However, Elliot Springs has opened up a new development front to the south, which will contribute to the increasing costs and inefficiencies associated with servicing the city (DSDMIP, 2020).

Townsville's current land use pattern—low-density residential development—has resulted in a dispersed and fragmented urban form with highly segregated land uses (Department of Transport and Main Roads, 2011). If incremental growth patterns remain unchecked, the costs of providing and maintaining infrastructure and services will increase, as will the loss of natural areas (DSDMIP, 2020). Urban sprawl has also led to long daily travel times and one of the state's highest private vehicle travel mode shares, at 89% (Department of Transport and Main Roads, 2017).

Townsville's communities value active living and recognise the need for urban planning to deliver better liveability outcomes. A recent community assessment by Place Score (2019) highlighted the place-based attributes that the community care about and underperforming attributes that require further attention. This work has since informed the development of TCC's *Liveability Strategy 2020–2024*, which seeks to strengthen Townsville's liveability assets and address identified areas for improvement through a comprehensive and citizen-centric approach.

Townsville's liveability strengths include access to local businesses, neighbourhood amenities and the natural environment. The people of Townsville are connected to their surrounding marine and terrestrial environments, as

evidenced through active lifestyles centred on water activities such as boating, fishing, paddle-boarding, and scuba diving. The community identified a number of liveability areas that they value but require improvement. The top priorities include improving neighbourhood and personal safety, followed by the general condition and quality of public open space.

These findings by Place Score (2019) are also reflected in the results of the Adapting to Coastal Change in Townsville Community Values Survey, which identified ‘lifestyle’ as the most important reason for living in Townsville (AECOM, 2019). Safety and the natural environment (river, beach, bushlands etc.) were considered ‘very important’ aspects of the Townsville lifestyle, followed closely by open spaces (street trees, footpaths, parks etc.). Both these surveys highlight the importance of the public realm in shaping people’s lived experiences, and the need for place-based, quality urban design and town planning to protect the values of Townsville’s community.

2.1.2 Water security and resilience

Townsville’s water story highlights a deep connection with water, beginning with the Wulgurukaba, Bindal, Nywaigi and Gugu Badhun Peoples who relied on the region’s waterways for survival and adapted their way of life to seasonal variations, through to the exploitation of water resources to support industrial expansion and post-war urbanisation. In the present day, water planning activities are responding to a complex set of local and global drivers such as water security, a changing climate and the condition of the Great Barrier Reef (Figure 4).

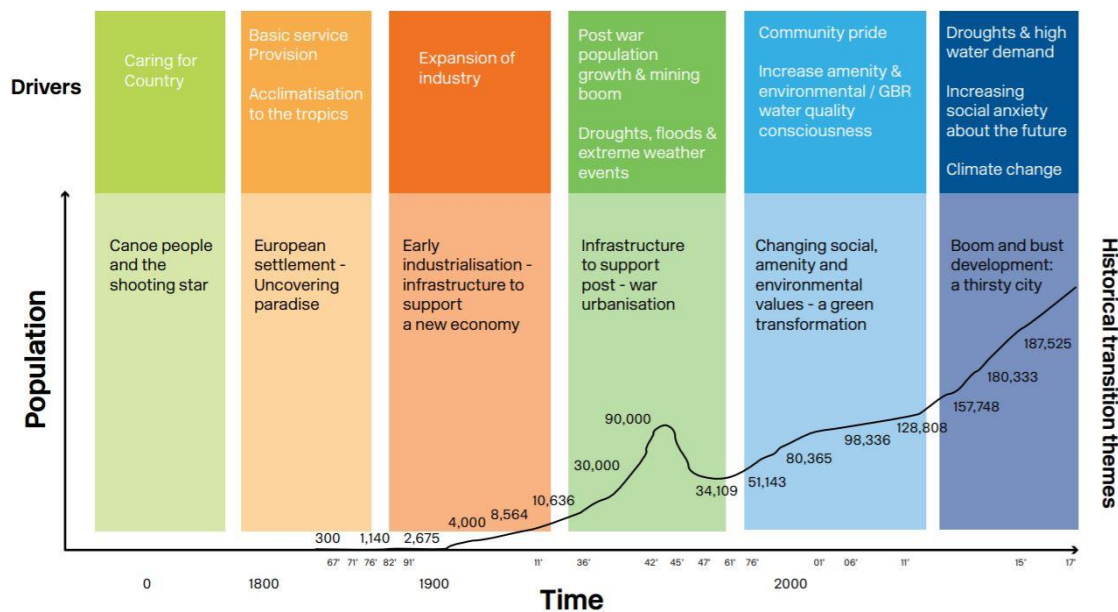


Figure 4. Townsville’s water story (Source: Hammer et al., 2018.)

Townsville relies almost completely on surface water storages for its domestic water supply. While groundwater resources exist, there are no direct, planned groundwater sources used for town water supply. Townsville obtains its water supply from the Ross River Dam (to the south) and Paluma Dam/Crystal Creek systems (to the north). Additional water can be sourced from the Burdekin Haughton Water Supply Scheme via the Haughton pipeline and pumping station when Ross River Dam is low (such as during extended drought periods, if the Ross River Dam capacity falls below 10%) (see Department of Energy and Water Supply, 2014).

TCC is currently working on three major projects to secure the city’s long-term water supply:

1. Haughton Pipeline Duplication Project to augment the city’s water supply. Once constructed, the duplicated pipeline can supply an additional 234 ML/day into the Ross River Dam, raising the combined pipeline capacity to 364ML/day (TCC, 2019a; Townsville Water Security Taskforce, 2018).

2. Recycled Water Re-use Scheme, which will treat wastewater from the Cleveland Bay Purification Plant to a high standard (Class A+) so it can be used to irrigate sporting fields, public open spaces, schools and large commercial properties (TCC, 2019b).
3. Water Smart Package, which offers up to \$10 million in vouchers and rebates for water efficient products (TCC, 2019c).

Townsville's dry tropics location and drought cycles mean that rainfall is sparse and intermittent, which affects the security of its water supply. Townsville relies on tropical systems or monsoon troughs coming down from the north for its rainfall but these systems often bypass Townsville due to its topography (Bureau of Meteorology, 2019). Interestingly, this context of scarcity is not necessarily reflected in current consumption patterns. Townsville's residents have some of the highest household and per capita water consumption rates in Australia. They use four times more water than residents in other major cities, with approximately 70% of total household water in Townsville used on lawns and gardens (TCC, 2019d). However, water restrictions have been effective in the past at temporarily reducing water consumption during dry periods, with household water use halving from up to 600 litres per person per day to 330 litres in 2015 (see Riley, 2016). Media coverage of this issue, particularly during dry periods, highlights the highly emotive and politically contested nature of this issue, which appears to be tied to legacy issues associated with regular droughts, failed wet seasons, and post-2007 local government amalgamations. The people of Townsville have a good understanding of water and water-related issues, with water literacy much higher than the national average on the majority of topics (Figure 5).

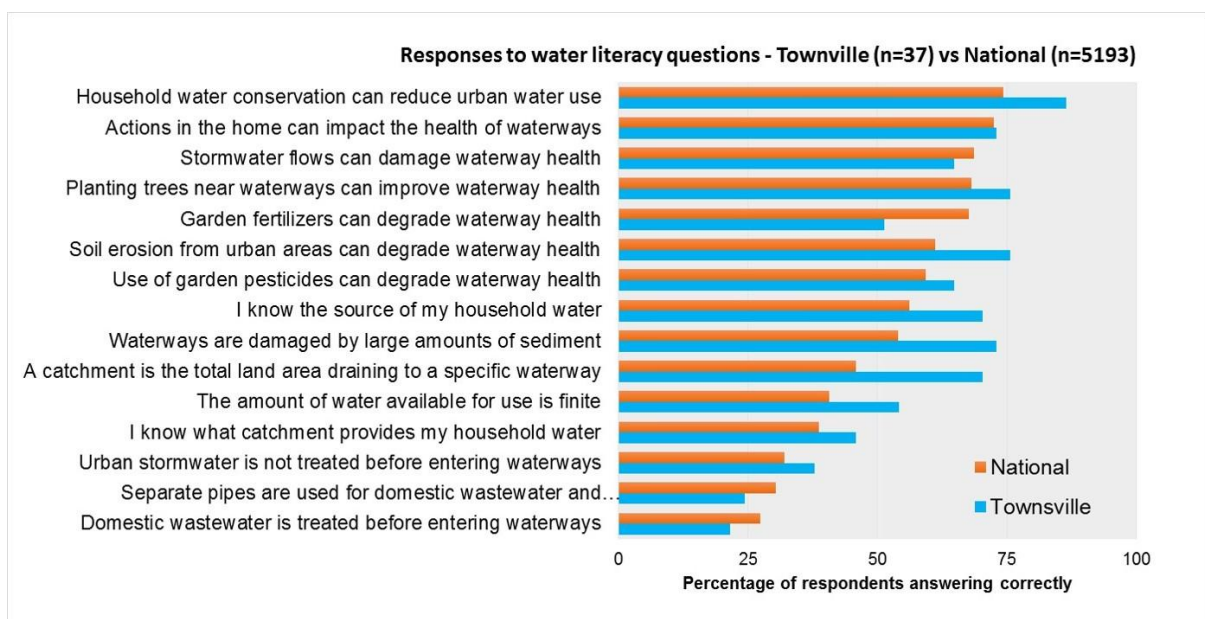


Figure 5. Water literacy scores for Townsville, compared with national data (Source: CRC for Water Sensitive Cities, 2015.) The data was collected as part of a national water literacy study in 2014 that aimed to establish a baseline understanding of Australians' knowledge of water and water-related issues (see Fielding et al., 2015).

At the other extreme, the Townsville region periodically experiences inundation from storm tides (cyclones), flooding in large waterways like the Ross River as a result of long rainfall periods, and flash flooding within the urban areas due to heavy, localised rainfall. The historical development of Townsville's low-lying areas has placed several communities at risk. First settlement occurred about 150 years ago on the Townsville coastal floodplain (see Figure 6), with many large residential areas located within the lower Ross River and Ross Creek floodplains as well as the Bohle River floodplain (see TCC, 2017). The costs of flooding are significant. For example, the monsoonal deluge in February 2019 has, at October 2019, resulted in 30,396 claims equivalent to \$1.247 billion (Insurance Council of Australia, 2019).

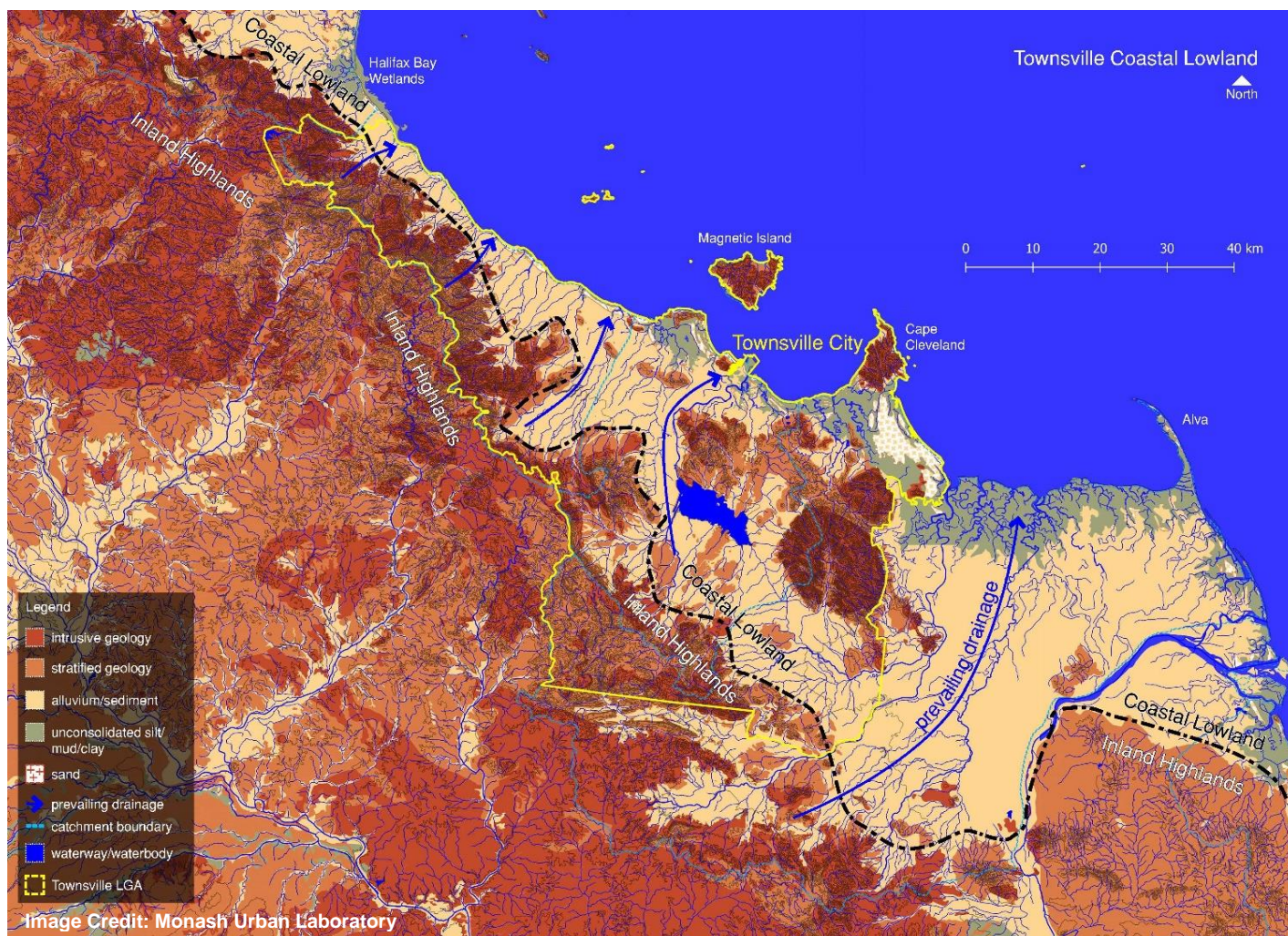


Figure 6. Townsville Coastal Plain. The Townsville Local Government Area predominately lies within a coastal lowland and largely alluvial or poorly consolidated sedimentary deposits. (Sources/Datasets: Wyatt et al., 1970 and open source data from TCC, Queensland Government, Queensland Spatial Catalogue and Geoscience Australia.)

The nature of flood risk in Townsville is likely to change as residential developments continue to expand and/or older areas are inappropriately redeveloped (e.g. building in under high-set homes). Climate change also has the potential to increase the severity of flooding, suggesting that the costs of flooding will continue to rise unless Townsville's communities and infrastructure are better able to cope and adapt to future flood events. The *Townsville Floodplain Management Strategy* seeks to build community resilience to flooding by guiding future infrastructure investment, land use planning and development controls, as well as strengthening emergency management procedures and increasing community awareness. This strategy requires policy and planning interventions that support regional-scale social adaptation through a coordinated approach between governments, industry and the community (see Dale et al., 2016).

2.1.3 Institutional arrangements

Institutions across Australia's three tiers of government play a role in shaping environmental, social and economic outcomes in Townsville. This is achieved through different roles and responsibilities at each level, as well as through cooperative arrangements (see Table 1). For example, the *Townsville City Deal* is a long-term commitment by all three tiers of government to work together to deliver a 'transformational impact for Townsville' (see Australian Government, 2019a). At the federal level, the Great Barrier Reef Marine Park Authority (GBRMPA) manages the Great Barrier Reef Marine Park. Protecting the Great Barrier Reef is a cooperative effort between the Australian and Queensland governments, guided by the Great Barrier Reef Intergovernmental

Agreement (see further discussion in section 2.1.4 below). The Agreement was updated in 2015 to reflect the shared vision for the future of the reef outlined in the Reef 2050 Plan.

Table 1. Key institutional arrangements relevant to Townsville

Tier of government		Key strategies and initiatives	
Australian Government <ul style="list-style-type: none"> - Great Barrier Reef Marine Park Authority - Department of the Environment and Energy - Department of Infrastructure, Transport, Cities and Regional Development 	Townsville City Deal Reef 2050 Plan Creek to Coral Program Townsville Floodplain Management Strategy Townsville Coastal Hazard Adaptation Strategy		
Queensland Government <ul style="list-style-type: none"> - Department of State Development, Infrastructure and Planning - Department of Environment and Science, which includes Office of the Great Barrier Reef - Department of Transport and Main Roads 			North Queensland Regional Plan North Queensland Regional Transport Plan Priority Port of Townsville Master Plan
Townsville City Council <ul style="list-style-type: none"> - Infrastructure and Operations (includes Townsville Water) - Planning, Environment and Cultural Services 			Townsville City Plan Townsville 2020 Masterplan Smart City Strategy Black Ross (Townsville) Water Quality Improvement Plan Water Demand Management Strategy Vision and Transition Strategy for a Water Sensitive Townsville

At the state level, the Queensland Government guides all strategic planning and development throughout the state. The Queensland Government is currently working with councils and the community to develop the first Regional Plan for North Queensland. This 25-year strategic, statutory planning document provides direction on how land use and infrastructure planning can best guide future growth and development in the region, in light of the opportunities and challenges presented by a changing climate, population growth and other environmental pressures.

At the local level, TCC is the local authority responsible for 'the good rule and local government of its local government area' (s 9(1), *Local Government Act 2009 (Qld)*). The planning, design and development of the city is the primary responsibility of TCC, guided by the *Townsville City Plan*, TCC's key long-term planning document. It identifies the issues and priorities for TCC over the next 25 years, and is the basis for other council plans, strategies, policies and processes. Unlike most local governments in Australia, TCC is an integrated entity, responsible for both land use planning and urban water management. The latter is done through Townsville Water, a commercial unit of TCC that provides water and wastewater services to the community, including supplying potable water, collecting and processing wastewater, and supplying recycled water.

2.1.4 Protecting waterways and the Great Barrier Reef

The City of Townsville was established on the Ross River which is a significant feature of the CBD. The Ross River, along with eight key waterways within the Townsville local government area flow to Cleveland Bay and Halifax Bay. The land use activities that take place across these sub-catchments have significant impacts on the quality of water of the Great Barrier Reef (GBR).

The GBR is the world's most extensive coral reef ecosystem located off the north-east Australian coast. The ecosystem, protected as a World Heritage Area since 1981, covers an area of 348,000 km² with 2300 km of coastline and an adjacent catchment area of 424,000 km² (Brodie et al., 2019). Key GBR ecosystems are in poor (and declining into poorer) condition, largely due to the collective impact of land runoff associated with past and ongoing catchment development, coastal development activities, extreme weather events, and climate change impacts such as coral bleaching events (Waterhouse et al., 2017; GBRMPA, 2019). Problems in the governance of the GBR have exacerbated these issues. Notably, weak policy, poor integration of efforts across competing

governance areas within the GBR, and limited implementation has led to poor outcomes for water quality management (Brodie et al., 2019).

The long-term conservation and protection of the GBR is a shared responsibility between the Australian and Queensland governments. At the federal level, the GBR is protected by two complementary pieces of federal legislation: the *Great Barrier Reef Marine Park Act 1975 (Cth)*, which oversees activities in the marine park, and the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*, which protects nationally significant matters including the Great Barrier Reef World and National Heritage areas (Australian Government, 2019b). At the state level, the *Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Act 2019 (Qld)* seeks to strengthen existing reef protection regulations. The new laws, which came into effect on 1 December 2019, recognise that efforts to date have had limited impact on water quality outcomes, and seek to address this issue by reducing pollution (nutrient and sediment) runoff from agricultural and industrial land uses (Queensland Government, 2019b). The recently released final master plan for the priority Port of Townsville also seeks to protect the Great Barrier Reef by ensuring all port-related development is sustainably managed in accordance with the *Sustainable Ports Development Act 2015 (Qld)* and the *Reef 2050 Long-Term Sustainability Plan* (Department of Transport and Main Roads, 2019). Overall, this legislative framework (at the federal and state levels) guides a range of management efforts across the GBR, with key management efforts summarised in Table 2 below.

At the local level, efforts have focused on improving the health and condition of local and regional waterways, beaches and estuaries. Because Townsville is home to the largest urban population in the coastal zone adjacent to the GBR, water quality issues associated with urban runoff are a key focus of management programs. According to the Townsville Dry Tropics Healthy Waters report card for 2017-18, the condition of 'water' (quality and quantity) in the Black and Ross River basins is 'moderate' (Dry Tropics Partnership for Healthy Waters, 2019), indicating that further efforts will be required to improve waterway health in the Townsville region.

Table 2. Key management plans and programs related to protecting waterways and the Great Barrier Reef

Plan or program	Description
Reef 2050 Plan	The Reef 2050 Plan was released by the Australian and Queensland governments. It is the overarching framework that guides the long-term protection and management of the Great Barrier Reef until 2050.
Great Barrier Reef Gully and Streambank Joint Program	This program focuses on remediating gully and streambank erosion to significantly reduce the amount of sediment entering the reef. It was introduced in 2016 by the Australian and Queensland governments.
Reef 2050 Water Quality Improvement Plan	This is the main mechanism for delivering against the water quality outcome from the Reef 2050 Plan and seeks to guide how industry, government and the community work together to improve the quality of water flowing into the reef. Responsibility for implementing the plan is shared by all levels of government.
Creek to Coral program	The Creek to Coral program seeks to maintain and enhance healthy waterways within the coastal dry tropics of the Townsville region. This is a joint initiative by the Queensland Environmental Protection Agency and Townsville City Council.
Black Ross (Townsville) Water Quality Improvement Plan	The Black Ross (Townsville) Water Quality Improvement Plan, prepared by Creek to Coral and its partners, focuses principally on managing urban and peri-urban stormwater related issues.
Dry Tropics Partnership for Healthy Waters	The partnership is a collaboration between community, industry, science, research and government seeking to improve the values of local catchments and the reef. It has supported the establishment of an annual report card on the ecological, social and economic health of Townsville's dry tropics waterways.

2.2 Townsville's water and urban future

Townsville recognises that water is not just a service to support urban development, but plays a pivotal role in protecting the way of life that the people of Townsville value (Hammer et al., 2018). Over the next 20 years and beyond, Townsville will face a number of challenges and opportunities that provide impetus for a new approach to urban planning and water resources management.

The continued **growth of Asian economies** will provide important economic opportunities in Townsville. As Asia becomes the centre of global economic activity (the so-called 'Asian century'), Townsville's proximity will create opportunities for supplying goods and services to Asia's increasingly urbanised and affluent populations. These include marketing North Queensland's agricultural produce through the Port of Townsville, expanding tourism offerings, and drawing on the region's high-quality tertiary education and training facilities to supply education and training services (DSDMIP, 2020).

Climate change projections indicate North Queensland can expect higher temperatures, hotter and more frequent hot days, more intense downpours, less frequent but more intense tropical cyclones, rising sea levels, and warmer and more acidic seas (Queensland Government, 2016). These changes, in combination with historically poor land management practices, will affect the ecological health of the natural environment, urban estuaries and the GBR, as well as Townsville's long-term water security and the ongoing viability of agricultural activities (DSDMIP, 2020). These impacts need to be clearly understood to better inform the development of programs that identify, protect and sustainably manage critical ecosystem functions. Additionally, planning for urban development will need to support community resilience, particularly as climate change increases the frequency and severity of natural hazards.

Most of North Queensland's **population growth** is expected to occur in Townsville, with Townsville's population likely to increase by another 30 to 60% (QGSO, 2018a). By 2031, couple-only families are expected to be the dominant household type in Townsville (TCC, 2014). Older persons will make up around 18% of the population in 2041, with 1 in 6 persons living in Townsville projected to be over 65 years of age (QGSO, 2018b). This growth and change in population will drive new and more diverse housing options over a **larger urban footprint**, with the number of dwellings in Townsville projected to increase by 36% (QGSO, 2018c). Townsville's Local Government Infrastructure Plan (Table SC3.1.3) indicates Townsville will require approximately 26,579 new dwellings (for the period 2011 to 2031) which can be accommodated within the existing net land supply. The bulk of new housing supply will be made up of greenfield developments (approximately 78%), supported by well-located infill development in the city's core (approximately 22%) (TCC, 2011). More recent residential land use analysis confirms the existing land supply alone can accommodate expected growth well beyond 2045 (DSDMIP, 2020).

These drivers along with others such as disruptive technologies, restructuring of the economy, and centralisation of the region are recognised in the *North Queensland Regional Plan* (NQRP) and form the basis of the regional vision espoused. That is, over the next 25 years, '*North Queensland thrives as a diverse, liveable and progressive region in the tropics, set around the capital of northern Australia*' (DSDMIP 2020, p.4). The plan recognises that advancing towards this vision will require more consolidated, efficient and sustainable growth patterns to improve the resilience and liveability of local communities and neighbourhoods over the next 25 years. It sets out principles and policies on urban design and planning that will influence the nature and form of future growth in North Queensland and particularly Townsville. These include:

- **Water quality:** Ensuring that new or changing land uses do not adversely affect waterways and receiving waters, and that priority rehabilitation areas are identified and managed to improve biodiversity and ecological functions (Regional policy 2.2.2).
- **Climate change:** Responding to climate change in land use planning and natural asset management through regular reviews and modelling of climate change scenarios to inform future growth planning and environmental management (Regional policies 2.3.1 and 2.3.2). This will help minimise the region's vulnerability to natural hazards and assist in adaptation strategies.
- **Urban form and land supply:** Containing Townsville's urban residential development within the Townsville Urban Area (as defined in the current City Plan) (Regional policy 3.1.5) to promote a more consolidated, efficient and well-integrated growth pattern (Regional policies 3.1.1, 3.1.4).

- **Liveable communities:** Supporting a greater mix of housing that responds to the needs and preferences of communities without compromising access to services and infrastructure (Regional policies 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5). The plan emphasises good neighbourhood design approaches that facilitate ‘gentle increases in urban densities’ (DSDMIP 2020, p. 68) to provide more varied housing typologies without radically changing the scale of local neighbourhoods (see Figure 7). This focus on neighbourhood planning supports place-making and enables the establishment of integrated infrastructure and greenspace networks. A network approach also supports the maintenance and improvement of natural assets to mitigate the risks of natural hazards, in association with avoidance, adaptation strategies and disaster risk management planning to reduce the vulnerability of urban areas (Regional policies 3.2.6 and 3.2.7).
- **Tropical urbanism:** Embracing tropical design principles to create more comfortable and sustainable built environments that align with the region’s character and identity (Regional policies 3.3.1, 3.3.2, 3.3.3). Features of ‘tropical urbanism’ include shading to windows and walls, verandahs and outdoor shaded sitting areas, variety of materials including lightweight, and large-scale vegetation.
- **Infrastructure networks:** Enhancing the resilience, reliability and cost-effectiveness of infrastructure networks through protection from incompatible land uses, planning and sequencing to minimise biodiversity impacts, collaboration across government and industry, catchment-scale planning for long-term water security, and management practices that embed circular economy principles (Regional policies 4.1.1, 4.1.2, 4.1.3, 4.1.5 and 4.1.6).
- **Transport connections:** Connecting the region through a cost-effective transport network by strategically locating intermodal hubs and tourism infrastructure, planning for consolidated urban and transport orientated development, and maximising transport infrastructure to support community and economic resilience (Regional policies 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.7).



Figure 7. Gentle increases in urban density at the streetscape scale (Source: DSDMIP 2020, Figure 10, p. 68.)

The regional vision and policies for North Queensland align with the direction of recent efforts at the local level. In the past five years, TCC and its stakeholders have increased focus on climate resilience, urban liveability, and ecosystem health. This focus is reflected in the vision for Townsville as a future water sensitive city, formulated in 2017 with 29 of Townsville’s leaders and strategic thinkers (Hammer et al., 2018). The vision (Figure 8) depicts the values and outcomes to be secured over the next 50 years, and is accompanied by a set of high-level strategies to address priority transition needs in the short- to medium-term:

- I. Embed Townsville’s water sensitive aspirations in a broad city vision and organisational policies, plans and strategies.
- II. Establish platforms that will support and drive integration and collaboration within council and with external stakeholders.
- III. Develop new knowledge on issues and potential solutions for particular aspects of Townsville’s water sensitive city vision.
- IV. Learn from and scale innovations to provide on-ground demonstrations and practical guidance for water sensitive approaches in the dry tropics context.

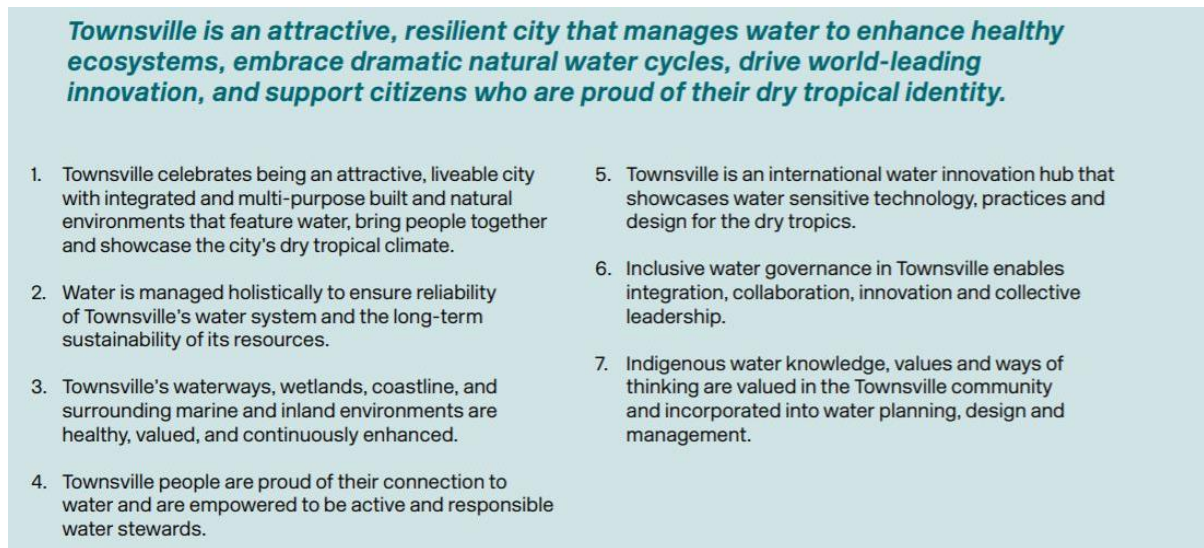


Figure 8. The 50-year water sensitive vision for Townsville (Source: Hammer et al., 2018.)

Townsville has generated strong momentum towards achieving its vision of a future water sensitive city. However, progressing the transition will require a strategic focus on overcoming the barriers to on-ground delivery, particularly those created by current regulatory frameworks and institutional arrangements which impede the emergence of water sensitive service delivery (see McCallum & Boulot, 2015). The remainder of this report describes the planning and water resources governance arrangements in Queensland, as they relate to Townsville, and briefly identifies the key barriers and opportunities for innovation.

3 Queensland planning framework

The *Planning Act 2016 (Qld)* (Planning Act) establishes the overarching framework of planning instruments that support Queensland's land use planning system (Figure 9). It replaced the *Sustainable Planning Act 2009 (Qld)* on 3 July 2017 but retains the fundamental rights, roles and responsibilities of the state, local government and community. The current planning legislation reflects the outcomes of a significant planning reform process. It removed the complexity of the previous legislation to establish 'an efficient, effective, transparent, integrated, coordinated, and accountable system' of land use planning and development assessment that facilitates the achievement of ecological sustainability (s. 3(1) Planning Act).

Queensland's performance-based planning system comprises three main elements (DSDMIP, n.d.):

- **Plan-making**, which refers to the processes for developing documents that guide all strategic planning and development throughout the state. A key document is the planning scheme prepared by each local government.
- **Development assessment**, which refers to the system by which local governments (and state agencies in particular circumstances) assess and make decisions on land use and development proposals. The Planning Act establishes the framework and process for development assessment (including application requirements), while the planning scheme sets out what development can occur in a given area and provides the basis for assessing applications.
- **Dispute resolution**, which refers to the avenues for resolving disputes related to development applications. Two key forums exist: a court-based process (Planning and Environment Court) established by the *Planning and Environment Court Act 2016 (Qld)*, and a low-cost and less formal process (Development Tribunal) set up in the Planning Act. The Tribunal deals with simple technical matters.

The discussion below focuses on planning instruments and the development assessment process within the planning system.

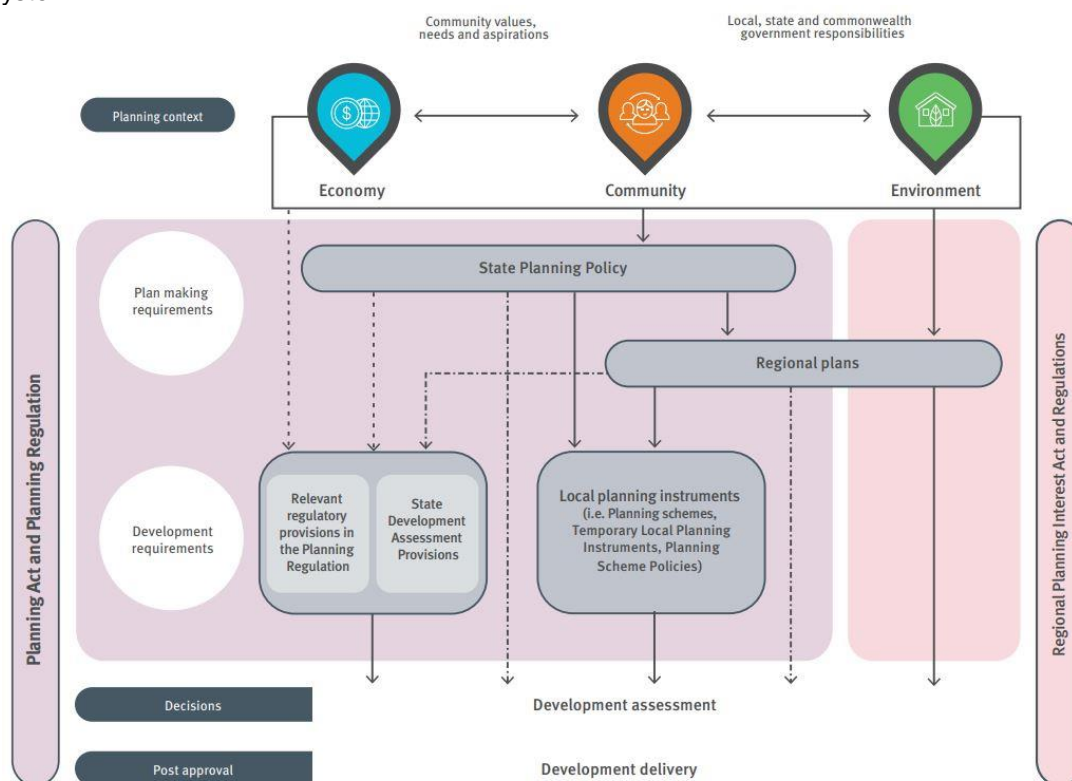


Figure 9. Queensland planning framework (Source: DSDMIP 2020, Figure 2, p. 8.)

3.1 Planning instruments

Planning in Queensland occurs at three levels: state, regional and local. Responsibilities for state and local planning are directly associated with the respective levels of government, while regional planning is primarily a state responsibility, although in practice it is undertaken as a cooperative activity between state and local governments.

The new Planning Act has two state planning instruments: the State Planning Policy (SPP), and the Regional Plan. These planning instruments set out matters that need protection and preservation, which must be considered and addressed in every local government local planning scheme (LPS).

3.1.1 State plans

SPPs detail what is critical for responsible land-use planning and development within Queensland and set the state government policy position for growth in the state. In general terms, this consists of 17 state interests under five broad themes consisting of Liveable communities and housing, Economic growth, Environment and heritage, Safety and resilience to hazards, and Infrastructure, as shown in Figure 10 below.



Figure 10. State interests in land use planning and development
(Source: Department of Infrastructure, Local Government and Planning, 2017.)

These SPPs provide the basis for the [Townsville City Plan \(Planning Scheme\)](#), to ensure state interests inform and direct local planning schemes. Of the five state themes, **Environment and heritage** focuses on water planning through state provisions on **Coastal environment**, **Water quality** and **Biodiversity**. They highlight the need for coastal protection and appropriate urban management within coastal zones, along with achieving water quality objectives, adopting stormwater management objectives (appropriate to climatic regions) and controlling development in water resource catchments.

The **SPP state interest – Coastal environment** requires the coastal environment to be protected and enhanced, while supporting opportunities for coastal-dependent development, compatible urban form, and safe public access. Coastal-dependent development requires land adjoining the foreshore and access to tidal water, therefore land use decisions must make suitable coastal areas available for these dependent activities. Planning schemes need to ensure developments such as ports, harbours and associated facilities are supported and not excluded as a result of other development which does not require a coastal location.

The **SPP state interest – Water quality** requires planners and assessment managers to consider environmental values (EVs) and water quality objectives (WQOs) for receiving waters. When amending and/or the drafting new planning schemes, local governments must account for the EVs and WQOs that exist within their local government area and determine their zones and overlays based on these environmental considerations. The planning scheme's strategic framework should include policy statements that ensure development incorporates the principles of total water cycle management and water sensitive urban design.

The **SPP state interest – Biodiversity** requires that matters of environmental significance are valued and protected and that Queensland's biodiversity is maintained or enhanced to support ecological integrity. This SPP also considers matters of national environmental significance, including natural values and features protected under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*. Similarly, the SPP defines matters of state environmental significance, while matters of local environmental significance can be determined by local government, at a local level. Land use zones and overlays should be determined based on the land's level of environmental significance.

3.1.2 Regional plans

Regional plans recognise the diversity of landscapes across Queensland and identify matters that are specific and applicable to each region. Currently, Queensland has 12 regional plans with another being developed. The *North Queensland Regional Plan* (NQRP) relates to Townsville, and determines how land use and infrastructure planning can cater for growth and population change over the next 25 years at a regional level (DSDMIP, 2020). The NQRP focuses on four regional goals:

- North Queensland be a leading economy in regional Australia.
- The region maintains a rich and healthy natural environment.
- Create liveable, sustainable and resilient communities that promote living in the tropics.
- Infrastructure networks support a safe, connected and efficient North Queensland.

As a statutory instrument, the NQRP is the key link between state-wide planning and local planning, and includes actions and implementation responsibilities for federal, state agencies and local governments within the region. It highlights Townsville's future role as the capital of North Queensland and seeks to consolidate its gateway position. As the largest regional city in North Queensland, Townsville currently forms the servicing and administration centre of the region based on its access to national and international markets, and its stable and well-connected central location.

Under the NQRP goal of **a rich and healthy natural environment**, water quality and climate change form key components of the regional outcomes. Water quality outcomes focus on ensuring land use does not adversely affect water quality in the GBR, while climate change needs to be considered as part of land use and natural asset decision making, to respond to the potential climatic variations of the region. Similarly, under the goal of **liveable, sustainable and resilient communities that promote living in the tropics**, urban form and land supply outcomes focus on consolidated and efficient development while supporting diverse housing typologies and choices that respond to the region's tropical climate.

The SPPs and regional plans are implemented via the LPS of each local government area. In Townsville, the *Townsville City Plan* is the statutory LPS that controls land use and development.

3.1.3 Local plans

The strategic framework of the Townsville City Plan includes strategic outcomes that form the land use objectives for the planning scheme. The four key strategies are **Shaping Townsville, Sustaining economic growth, Environmentally sustainable future, and Strong, connected community**. The 'Environmentally sustainable future' objective focuses on the relationship between water and land use planning. It advances the delivery of water sensitive development through five elements; natural assets, integrated water cycle management and ecosystem health, coastal management, natural hazards (bushfire, landslide and flood) and sustainability. These elements specify outcomes to protect waterways, wetlands, water quality and water use in association with conserving coastal resources, minimising risk, minimising energy consumption and responding to local climatic conditions.

As the primary tool for guiding and regulating Townsville's development, the City Plan has statutory force under the Planning Act. It replaces two previous planning schemes related to the former Thuringowa and Townsville local government areas (amalgamated in 2008). It uses the following tools to achieve the city's strategic objectives:

- zones and precincts
- overlays to protect and conserve environmentally significant habitats, corridors and buffers
- lot size provisions
- development requirements for assessment
- engineering standards
- development standards
- landscape principles
- Australian Standards
- planning scheme policies, and
- best practice guidelines.

The City Plan also includes **Part 4 Local government infrastructure plan (LGIP)** which allows TCC to levy infrastructure charges on development. The LGIP identifies the trunk infrastructure necessary to service a local urban area, including water supply, sewerage, roads, footpaths and cycle ways, and parks and land for community facilities. Stormwater networks are planned and managed separately at a catchment and sub-catchment level.

Townsville's LGIP relates to residential and non-residential development, for both infill and broad-hectare densities, with specific rates for each type of development. It also includes demand summaries for infrastructure items required to service future development along with associated costs. This approach allows TCC to estimate the cost of infrastructure provision including community facilities and assist in its long-term financial planning.

Local governments can also use temporary local planning instruments (TLPIs) to respond to changing and emergent planning issues and are generally specific to a site or localised issues. TLPIs are not designed to be comprehensive, but allow councils time (two years) to incorporate them into their planning schemes, if required. A TLPI may be prepared to provide protection pending listing on a local heritage register, or specify requirements for development in areas affected by disasters (i.e. flooding) until these provisions are included in the planning scheme. The Minister can also make a TLPI to give effect to a state interest.

A planning scheme policy (PSP) informs a planning scheme, and sits in a schedule to the planning scheme. Each council sets its own PSPs which applicants predominantly interact with when lodging development applications. The Townsville City Plan, under Schedule 6, lists nine PSPs covering topics such as residential character, cultural heritage, bushfire and flooding hazards and parking rates.

All of these tools influence the development application process, and present an opportunity for us to examine how they affect on-ground outcomes and integrated water management solutions.

Other supporting statutory instruments include the following:

- The Minister's Guidelines and Rules detail how councils make and amend local planning instruments and include both guidelines and rules. This instrument explains the roles of state and local government, and public notification requirements. It also outlines how infrastructure designation and natural hazards planning are carried out and provides guidelines on environmental assessment, the process for working out the cost of infrastructure (offset or refund) and the criteria for deciding a conversation application.
- The Development Assessment (DA) Rules explain the rules governing the assessment of development applications. It outlines the process for lodging, assessing and deciding an application and how public notifications should be conducted. If these rules aren't followed, the decision can be appealed for not following due process. The DA Rules are prepared and drafted by the Department of State Development, Manufacturing, Infrastructure and Planning.
- State Development Assessment Provisions (SDAP) set out the matters of interest to the state and provides the criteria for assessing development applications where the state government is the assessment manager or referral agency for a development application.

3.2 Development assessment

Chapter 3 of the Planning Act outlines the development assessment framework and contains the most foundational changes to the planning system. It defines and describes categories of development and assessment and explains how to make, change, assess and decide development applications, and provides the head of power for the DA Rules. It outlines the rights and responsibilities for development approvals, including how to seek changes and extensions, clarifies the Minister's powers relating to the development assessment system and includes various miscellaneous provisions.

Development assessment generally refers to **assessable development**; that is, development that requires a development application to be lodged and an assessment of that form of development to be made and determined. The main types of development listed under the Planning Act include carrying out building work, operational work (e.g. earthworks, vegetation clearing etc.), subdivision, change of use and carrying out plumbing and drainage work (generally managed by councils and regulated under the *Plumbing and Drainage Act (2002)* (Qld). Accepted development does not require these steps of assessment because it conforms to established and accepted guidelines.

Categorising instruments under the Planning Act consist of the Planning Regulation, an LPS, a TLPI or a variation approval. These instruments can categorise development as either accepted, assessable or prohibited. They also specify the category of assessment required, and set out assessment benchmarks and other matters against which the application must be assessed.

There are two categories of assessable development: code assessable or impact assessable. **Code assessment** must be assessed only against assessment benchmarks (in the categorising instrument) and matters prescribed by the regulation. The assessment manager must approve the development application to the extent it complies with assessment benchmarks, or impose development conditions if compliance with assessment benchmarks cannot be achieved. **Impact assessment** must be carried out against the assessment benchmarks and matters prescribed by regulation, and may be carried out against, or having regard to, any other relevant matters.

In deciding a development application, the assessment manager must approve all or part of the development application, approve all or part with conditions, or refuse the development. An assessment manager may also decide to give a **preliminary approval** (which approves the development but does not authorise the carrying out of assessable development), a **development permit** (which authorises the development), or both. A preliminary approval may also include a **variation approval**, which can give approval to vary a local planning instrument.

The Townsville City Plan provides the assessment criteria or benchmarking at the local level against which local development applications are assessed. Within the plan, **Part 5 Tables of assessment** identifies the category of development, and the category of assessment and assessment benchmarks for assessable development. The assessment benchmarks and requirements, in general terms, include:

- whether a zone code or specific provisions in the zone code applies
- if there is an overlay, whether an overlay code applies or whether the assessment benchmarks as shown on the overlay map apply
- any other applicable code(s) (shown in the 'assessment benchmarks for assessable development and requirements for accepted development' column), and
- any requirements for accepted development which must be met for the development to remain accepted.

The Queensland Government created the Townsville City Waterfront PDA in September 2014, in association with TCC and the Port of Townsville, and adopted the **Townsville City Waterfront PDA Development Scheme** in 2015. Following these decisions, the TCC adopted the **Townsville City Waterfront PDA Design Guidelines** and **Inspirational Guidelines** in January 2019. The guidelines deliver consistent development outcomes within the Townsville City Waterfront PDA area, defined as Area A (TCC, 2018).

Development of the Townsville City Waterfront PDA will be facilitated as part of a partnership between the Queensland Government, the Port of Townsville and TCC with planning and development assessment responsibilities shared across state government and council (TCC, 2019e). Development assessment powers in Area A have been delegated by the Minister for Economic Development Queensland (MEDQ) to TCC, while Area B will remain under the control and determination of the MEDQ.

The Queensland Government instigated master planning for the Port of Townsville in accordance with the *Sustainable Ports Development Act 2015 (Qld)* (Ports Act) and the *Reef 2050 Long-Term Sustainability Plan*. The **Master plan for the priority Port of Townsville** recognises the port as critical to the economic future of the region and state, and establishes a foundation for economic growth generated by port industries (Queensland Government, 2019a). The master plan supports ongoing investment and is aligned with the Townsville Port Expansion Project, the Townsville State Development Area, the proposed Townsville Eastern Access Rail Corridor and the North West Minerals Province export route.

The master plan identifies 16,500 hectares of land and marine areas vital for the sustainable development of the Townsville Port to 2050. It outlines a strategic vision for its economic growth while protecting the GBR. It includes objectives and outcomes for developing the port, surrounding land and marine areas, and identifies an environmental management framework, which includes mapped environmental values and manages potential development impacts. Seven separate precincts exist within the master plan under the headings of **Environmental Management, Infrastructure and supply chain corridors, Interface, Marine, Marine infrastructure, Marine services and recreation, and Port industry and commerce**. The Queensland Government released the *Draft port overlay for the priority Port of Townsville* in November 2019 for public comment. The port overlay, once finalised and adopted, will form the regulatory instrument that will implement the master plan, in accordance with the Ports Act.

Given the rapid growth experienced across Queensland cities, it is important that the urban environment delivers high-quality places, improves quality of life and is distinctly Queensland. **QDesign** is a policy document committed to achieving better urban design outcomes for Queensland (Queensland Government, 2018). It recognises and values the importance of urban design in delivering liveable and sustainable communities, and provides a design-led methodology for all built environment practitioners. The document offers, for the first time, a unifying position statement of priority design values for Queensland. It defines nine priority principles to guide the design, development and delivery of buildings, streets, parks and open spaces which are relevant at all scales, for all projects (Figure 11). The flow on effects of QDesign for Queensland cities is to implement further context specific design-based policies. TCC is currently considering the opportunity of formulating a **TDesign** document that will address the local design constraints that face Townsville's built environment, within the dry tropics climate.

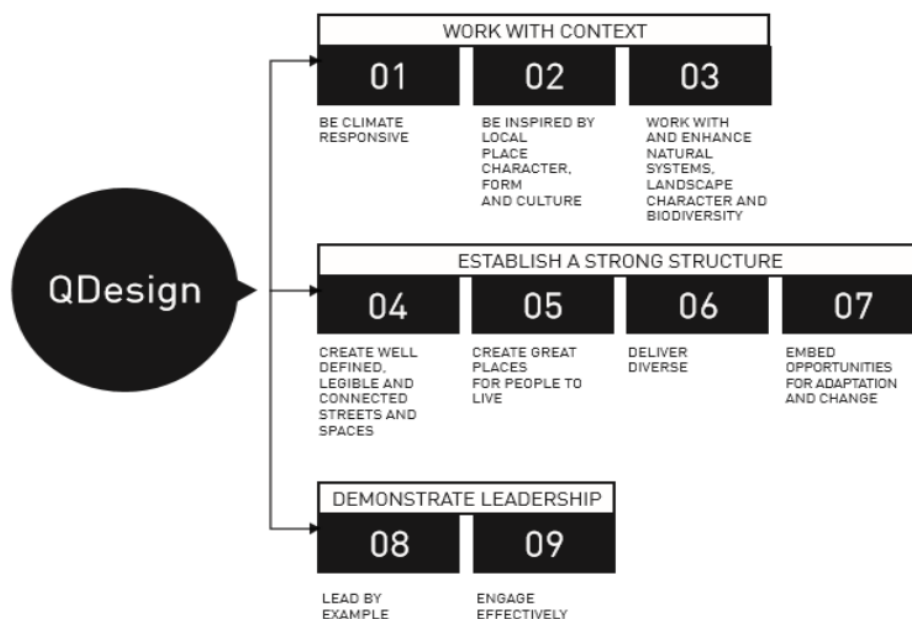


Figure 11. QDesign Vision – the nine principles (Source: Queensland Government, 2018.)

Other requirements for designing and siting of dwellings can be found in national codes and standards, such as the National Construction Code. In Queensland, reference must also be made to the Queensland Development Code (QDC), a building standards framework that extends the scope of the Building Code of Australia for specific application in Queensland. The QDC sets out design, setback and siting requirements for detached dwellings, dual occupancies and associated domestic structures such as garages and pools. These are default standards that are applied unless a local government's planning scheme specifies alternative requirements that are tailored to their locality and desired or future character. In cases where the LPS and the QDC differ, the LPS overrides the QDC requirements (Business Queensland, 2019).

3.3 Urban water planning

A number of different state Acts and environmental legislation control water planning and management within Queensland's urban environment. Due to the different components of water use and servicing (i.e. consumption, collection, storage, treatment, management, environment, biodiversity, stormwater and wastewater disposal), different Acts manage different aspects of the water cycle.

Urban development that includes taking or interfering with water and coastal development is dealt with under the Planning Act and prescribed under the Planning Regulation 2017. Development applications are then assessed against the SDAP to ensure that state interests are protected and the taking of water from the natural environment is sustainably managed.

3.3.1 State legislation

The *Coastal Protection and Management Act 1995 (Qld)* protects and manages coastal resources, biodiversity, coastal wetlands, landforms and physical coastal processes and ensures development decisions safeguard life and property from coastal hazards. It achieves this through Coastal Management Plans, defining coastal management districts, the coastal zone and erosion-prone areas where coastal planning and development assessment provisions are applied under the Planning Act.

The *Water Act 2000 (Qld)* (Water Act) provides a legislative basis for the sustainable planning and management of Queensland's water resources. To protect or give effect to the state's interests, matters relating to water resources are addressed in Water Plans (previously called Water Resource Plans) to achieve a sustainable balance between water users and the environment.

Water plans provide the management framework for water resources, outlining outcomes, objectives and strategies for achieving a sustainable (economic, environmental, social and cultural) balance between water users and the environment. These plans state environmental outcomes associated with allocating and using water in the plan area, including consideration of wetlands, watercourses, underground water/groundwater (where applicable) and overland flow.

Townsville's groundwater usage is monitored only in the **Bluewater Sub-Artesian Area** as a 'Declared Area' under the Water Act (TCC, 2007). Within this declaration the 'Black River Restricted License area' protects Queensland Nickel's water allocation via the *Queensland Nickel Agreement Act 1988 (Qld)* for unlimited mining use. This area consists of approximately 1200 km² with bore licences restricted and issued only under certain conditions. Approximately 1600 private/residential bores are understood to exist within the restricted area. The sustainable groundwater yield and extent of the aquifer is yet to be clearly defined and is subject to change given climate and water balance impacts.

The *Environmental Protection Act 1994 (Qld)* (EP Act) and its subordinate legislation provides a range of tools from licensing systems to environmental protection orders. The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (previously Environmental Protection (Water) Policy 2009) is given affect under the EP Act. Its purpose is to protect Queensland's waters, while supporting ecologically sustainable development.

Queensland waters include water in rivers, streams, wetlands, lakes, groundwater aquifers, estuaries and coastal areas. The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water and Wetland Biodiversity)) seeks to achieve the EP Act objectives by:

- identifying environmental values for waters and wetlands to be enhanced or protected
- identifying management goals for waters
- stating water quality guidelines and water quality objectives for enhancing or protecting the environmental values of waters
- providing a framework for making consistent, equitable and informed decisions about waters, and
- monitoring and reporting on the condition of waters.

Implementation of the EPP (Water and Wetland Biodiversity) is based on creating and mapping EVs and WQOs. EVs define the water uses by aquatic ecosystems and humans (e.g. drinking, irrigation, aquaculture). WQOs define the physical, chemical and biological characteristics of water (e.g. nitrogen content, dissolved oxygen, turbidity, toxicants, fish). Figure 12 summarises the ways in which EVs and WQOs can be used in statutory and non-statutory decision making.

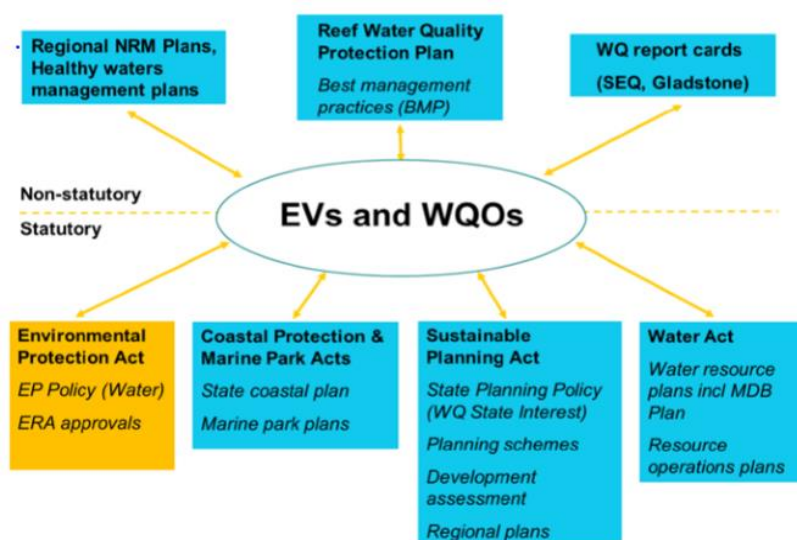


Figure 12. EVs and WQOs use in statutory and non-statutory decision making (Source: Department of Environment and Heritage Protection n.d.)

The EVs and WQOs for Townsville region waters (Black and Ross River basins, Magnetic Island and coastal waters) form part of Schedule 1 of the EPP (Water and Wetland Biodiversity) and inform planning and decision making for urban land development. They were derived from information in the **Black Ross (Townsville) Water Quality Improvement Plan (2010)**, available local water quality data, GBR water quality guidelines, and Queensland and national water quality guidelines. These objectives are summarised in Table 3.

Table 3. Scheduled environmental values and water quality objectives for Townsville (Source: Department of Environment and Science, 2019a.)

Waters	Basin no.	Schedule 1—Document Environmental Values and Water Quality Objectives	Schedule 1—Plan Surface fresh water	Schedule 1—Plan Coastal waters	Schedule 1—Plan Ground waters
Black River Basin , including all waters of the Black River Basin, and adjacent coastal waters	Basin 117	Black River Basin	WQO1171 Black River Basin	WQO1183 Halifax and Cleveland Bay	WQO1184 Black and Ross River Basins Groundwater Zones
Ross River Basin and Magnetic Island , including all waters of the Ross River Basin, and adjacent coastal waters	Basin 118	Ross River Basin and Magnetic Island	WQO1181 Ross River Basin WQO1182 Magnetic Island	WQO1183 Halifax and Cleveland Bay	WQO1184 Black and Ross River Basins Groundwater Zones

The *Water Supply (Safety and Reliability) Act 2008 (Qld)* (WSSR Act) regulates water supply across Queensland which includes monitoring water service provider performance, drinking water quality and provision, and recycled water quality. It is administered by the Department of Natural Resources, Mines and Energy (DNRME), which is responsible for implementing, monitoring and enforcing the WSSR Act. Queensland Health are also involved as a co-regulator because they administer the *Public Health Act 2005 (Qld)* and Public Health Regulation 2018, which support the WSSR Act.

Under the WSSR Act a water service includes: water harvesting or collection (e.g. dams, weirs, bores, extraction from watercourses); transmission of water; reticulation of water; drainage infrastructure (excluding stormwater); water treatment and water recycling. Similarly, water service providers provide drinking water (mainly local governments) and/or recycled water (where another water or sewerage service is provided), and include bulk water service providers and water authorities (Queensland Government, 2019c). TCC provides both drinking water, sewerage services and recycled water, as the local government service provider. DNRME ensures that all systems are managed effectively, that water service providers are regulated and that they comply with and understand their obligations under the WSSR Act.

3.3.2 Local policy

The Townsville City Plan includes a **Water resource catchment overlay code** under Part 8.2.9. The code seeks to protect water quality, natural environment and ecological values, and hydrological and ecological processes by maintaining the water resource catchment area (as defined in Overlay map OM-09) in a natural state and protecting it from the impacts of development activities. To achieve these outcomes, the code contains assessment benchmarks that specify the matters against which proposed developments must be assessed. Further assessment benchmarks are contained in Part 9 Development Codes, as identified and applicable in **Part 5 Tables of assessment**. These codes cover a number of issues related to development and can be specific to a planning scheme area. Listed under **Part 9.3.2 Healthy Waters Code**, these benchmarks seek to ensure development manages stormwater and wastewater as part of an integrated total water cycle and helps protect the environmental values specified in the EPP (Water and Wetland Biodiversity).

Townsville's City Plan also includes a Development manual PSP that details design standards for development. Schedule six includes design standards under subsection **SC6.4.3.8 Stormwater management plans for development** which outlines the requirements for development to demonstrate how proposed stormwater management is protecting water quality and quantity. Preparing a conceptual site-based stormwater management plan (CSBMP) or a site-based stormwater management plan (SBMP) is required to address the impacts of the proposed development and detail mitigation measures against unacceptable risk.

The guidelines also detail the requirements for a CSBMP to be prepared based on site size, amount of impervious area and distance from natural assets of environmental importance (Overlay map OM-08). It specifies what needs to be included in the SBMP to inform decision making on proposed water assets for the development. The proposed water assets and mitigation measures recommended in the SBMP are expected to ensure the environmental values established under the EPP (Water and Wetland Biodiversity) are protected, by providing natural water infiltration, using water sensitive urban design (WSUD) and best practice stormwater management.

Operational work guidelines also include water quality objectives that specify the need to identify state defined EVs and WQOs and include measurable water quality goals. The associated WQOs form the basis for defining the required water quality of urban stormwater entering local waterways. The three ways, at a site scale, to estimate the level of stormwater quality improvements necessary are specified under monitoring, modelling and best practice, to ensure WQOs are considered to protect council infrastructure and EVs for waterways.

A further subsection **SC6.4.3.9 Water sensitive urban design guidelines** adopts the *Water Sensitive Urban Design Technical Design Guidelines for South East Queensland, Version 1, 2006* (or as amended) with the exclusion of Chapter 1 and 6. This guideline adopts design objectives for stormwater management for the coastal dry tropics in terms of mean annual pollutant load leaving a development site, compared with traditional urban design where stormwater is not treated:

1. $\geq 80\%$ reduction in total suspended solids load
2. $\geq 65\%$ reduction in total phosphorus load
3. $\geq 40\%$ reduction in total nitrogen load
4. $\geq 90\%$ reduction in gross pollutant load.

The Queensland Urban Drainage Manual provides further information for developers, catchment managers and decision makers to manage urban stormwater and protect the environmental values of waterways. It summarises planning and technical material on best practice urban stormwater quality management.

Schedule six also includes subsection **SC6.4.3.21 Townsville Water planning and design guidelines** which details the relevant guidelines required for planning and design projects and collates Townsville Water practices. Developed by the Programs and Technical Support department within Townsville Water, it details the procedures undertaken during sewerage and water supply distribution, collection, pumping, treatment and effluent reuse. Subsection **SC6.4.3.23 Water and sewer network modelling guidelines** are also expected to be used in conjunction with the design guidelines.

Regarding floodplain planning, **SC6.7 Flood hazard planning scheme policy** provides background information on the derivation of the Flood hazard overlay. Identified via the overlay maps OM-06.1 and OM-06.2, this policy provides applicants with additional information and guidance on how to meet the requirements of the Flood hazard overlay code and includes application requirements for development.

In addition to requirements for integrated water management as part of development, the Townsville City Plan also addresses the protection of natural assets under **SC6.9 Natural assets planning scheme policy**. This policy details the environmental importance of natural assets and categorises the likely environmental protection required to maintain habitat, species, vegetation communities, strategic habitat units, ecological processes, ecosystems and hydrological function. This policy outlines the benchmarks and requirements for an Environmental assessment report (where required) to show what impacts a development may have on the environment and mitigation measures.

4 Enabling water sensitive greenfield development

The *Ideas for Townsville: Greening the public realm in a dry tropics city* (CRCWSC, 2020) proposes localised urban form, landscaping and water servicing options to enhance the liveability of greenfield growth in Townsville. Successfully implementing this palette of design elements will require an understanding of the enabling context provided by organisational and institutional environments. Drawing on interview and workshop insights, academic research and publicly available documents, this section discusses issues and opportunities to advance Townsville's water sensitive agenda. Each opportunity is aligned with an overarching transition strategy from the [Vision and Transition Strategy for a Water Sensitive Townsville](#) (Hammer et al., 2018), with specific implications for Townsville's corporate strategies and/or City Plan highlighted where relevant. The discussion draws on examples from other Australian jurisdictions to provide practical lessons for Townsville. Illustrative quotes from participants or relevant secondary documents have also been included.

Our analysis suggests that effectively enabling the transition to a Water Sensitive Townsville will require a multi-pronged program of intervention across organisational and institutional environments. At the broader scale, mainstreaming water sensitive practices needs to be considered in light of Townsville's historical, political, economic and environmental contexts. Townsville sits within a large floodplain. The hydrology and topography of this floodplain landscape plays a significant role in the ongoing evolution and growth of the city, but this deep structural context is not always recognised as the foundation of planning for greenfield development (CRCWSC, 2020). Townsville's strategic position and regional status as a 'gateway city' has made it the unofficial capital of North Queensland. But this appears to have diminished the city's unique identity, with the strong sense of belonging and place exhibited by the local Townsville community failing to translate into a meaningful and unique Townsville 'brand' or national profile distinguishable from that of North Queensland.

Resolving Townsville's identity, in the context of its place, will be essential for its future as a thriving and attractive regional centre. Making Townsville a location of choice for permanent living, with a sustainable local economy, will support greenfield growth and the adoption of water sensitive practices. This transition begins with people owning a clear vision for Townsville that is uniquely 'Townsvillian' and connected to water, a defining feature of its physical landscapes. It should also recognise the role of the nationally and internationally significant GBR as a driver for excellence in water management and land use practices. Townsville's political and institutional leaders have the opportunity to steer a more water-centric, place-based urban planning agenda. This requires a clear line of sight from strategy through to policy and implementation.

Ongoing reviews of the Townsville City Plan and other strategic planning documents create opportunities for TCC to reflect on and reconsider current functions, instruments and processes. Implementing a water sensitive vision for Townsville will require strengthening both corporate positioning and planning instruments, along with organisational commitment to uphold policy positions that guide future planning and contextually appropriate urban development. A supportive organisational culture that embraces innovation and encourages continuous learning will be important. Similarly, efforts should be directed towards connecting individuals across organisational silos and equipping them with the understanding, skills and tools they need to successfully operationalise water sensitive principles.

4.1 Understanding the Townsville context

4.1.1 Townsville's identity: the role of government intervention

Townsville's unofficial status as the capital of North Queensland is based on the ongoing consolidation of the Port of Townsville (encompassing 16,500 hectares) as a gateway to national and international markets, and its central location within the state. Its growth as a port town, since 1866, is directly related to its proximity to Asia and northern hemisphere markets, with international trade facilitating food, mineral and defence exports valued at approximately \$9 billion annually (Queensland Government, 2019a).

This strong strategic position has facilitated continued federal and state government investment in trade, defence, health and education supporting Townsville's growth, above and beyond the contributions of its local industries and local economy. Notably, the city's location at the centre of the GBR and its regional status has resulted in

both federal and state government authorities locating the GBRMPA and certain functions of the Queensland Department of Environment and Science in Townsville. These authorities indicate the significant role that Townsville plays in the marine and environmental context of both Queensland and Australia.

The mining industry boom from the early 2000s provided employment opportunities for those within and external to Townsville, placing it in a strong position to support population growth and provide affordable housing. The abundance of land provided a resource that would stimulate the local housing and construction industry up until mid-2014. However, the end of the boom has seen the decline in both the land and housing markets, with land sales now down to just over 300 lots a year (Table 4).

Table 4. New house and vacant land sales, Townsville and Queensland, 12 months ending 31 December 2018 (Source: QGSO, 2019.)

LGA / State	Number of sales		Median sale price	
	New houses	Vacant land	New houses	Vacant land
Townsville	122	332	\$385,000	\$160,000
Queensland	2,802	12,179	\$470,000	\$235,000

Townsville's desire to enhance its liveability and amenity, by re-engaging with its river front heritage and reimagining its future character as a waterfront city, is important to supporting growth in the local tourism economy and the construction industry. The Townsville City Waterfront PDA is a key component of the city's revitalisation. As a major urban renewal project, the PDA seeks to catalyse the CBD's revitalisation by redeveloping and activating prime inner-city land along Ross Creek. TCC has further progressed this work through **Townsville2020**, a transformative masterplan which seeks to build on state investment through small and medium infrastructure projects adjoining the PDA, as well as showcase development opportunities and potential synergies for expansion to enhance Townsville as a place to live, work and experience (Pure Projects, 2017).

Federal and state government investment in recent years appears focused on Townsville's strategic role as an entry point to North Queensland. This role is also reflected at the local level, in TCC's vision for Townsville as the "*Capital of North Australia*" (TCC 2019f, p. 2), which echoes the community's vision for Townsville as "*the northern gateway to Queensland*" (TCC, 2010). However, defining it as a gateway diminishes Townsville's status as a centre of business and trade, and its intrinsic nature as a cultural hub and gathering place. Such inability to articulate Townsville's identity creates the perception of a place that you pass through rather than embrace as a great place to live. This was recently highlighted by Tourism Think Tank (2017), which through community engagement concluded that "*there was no existing meaningful Townsville brand in the community's mind*". Similarly, strategic analysis by Pure Projects (2017, p. 6) found through community consultation "*that Townsville did not promote... some of the areas in which the City is a World Leader*, particularly around research into coral reefs, tropical medicine and the Reef HQ Aquarium, the only aquarium in the world with a live coral reef.

The strength of the tourism industry in Townsville depends on its local assets of people, character, history, climate, topography, its national and international transport network and position adjacent the GBR. As an example, Townsville boasts the first Museum of Underwater Art (MOUA) in the southern hemisphere, joining the likes of London, Cancun and the Bahamas in the northern hemisphere. As a major international attraction, it further supports the local tourism industry and the local assets of Townsville, enhancing marine science and research around reef conservation, restoration and education on a global scale (MOUA, 2018). However, despite these unique attractions, the Transforming Townsville project (known as *Townsville2020*) sets an agenda of "*enhancing our city, not trying to change it*", missing the opportunity to clearly define Townsville's future identity and aspirations.

An example of redefined identity for a port town can be seen in Newcastle, New South Wales. Its port origins were associated with regional mining and steel manufacturing. However, Newcastle's local economy declined since BHP's steelworks closed in the 1990s. Yet Newcastle's approach to decline has been to continually face it with strategies for growth and transformation, to shift from an industrial town to "*a leading lifestyle city with ... unique urbanism*" as defined in the *Newcastle 2030 Community Strategic Plan*. The desire of Novocastrians to redefine their city and its vision for Newcastle as a "*smart, liveable and sustainable global city*" (City of Newcastle, 2018) shows clear direction by the council to drive change, while acknowledging their lead role in implementation requires collaboration and partnerships to realise long-term goals (City of Newcastle, 2018).

Townsville's origins as a port town speaks to its water context and characterises its identity as a waterfront city. Like many Australian coastal settlements, waterways were fundamental to Townsville's establishment. Ross Creek is regarded as the city's 'birth place' reflecting its pivotal contribution to the historical development and heritage of central Townsville (TCC, 2018). Waterways shape and define much of the local government area, with key growth areas situated around multiple floodplain river systems, notably the Ross, Black and Bohle Rivers. This has influenced the character and values of local communities, with the pursuit of 'active lifestyles' regarded as a key reason for living in Townsville (AECOM, 2019). Most forms of active living are centred on water activities such as boating, fishing, paddle-boarding, and scuba diving, and is reflected in high rates of boat ownership, with one boat registered for every eight people in Townsville in 2018¹.

Despite the centrality of water to Townsville's evolution, and the lifestyles of local communities, water does not feature strongly in the community and TCC visions for Townsville. Where it is identified, the focus is often issue-specific such as water supply, water quality, flooding or ecosystem health, with limited consideration of the total water cycle. The absence of a holistic 'water vision' has in turn created a gap in strategic thinking around water, such that state and federal interventions have been required to, for example, investigate and progress water security solutions via the Townsville Water Security Taskforce, and provide support services in times of crisis.

These government interventions strengthen the external influence on decision making for Townsville as a city and its reliance on other government authorities to determine and direct its future. This in turn reinforces a diminished sense of local responsibility in decision making, forward planning, influence and ownership in outcomes. The interviews highlighted a culture of being 'bailed out', because people take the view that "*central government has to fix this, it's got nothing to do with us*".

TCC recognises the need for a water-centred city vision, prompting a recent collaboration with the CRCWSC to co-develop a set of short- to medium-term transition strategies. The 50-year vision for Townsville as a future water sensitive city recognises water as the life blood of the city and Townsville's future as an emerging capital and custodian of the GBR and all that it encompasses. This vision represents an opportunity for Townsville to position itself as a unique destination with a strong local and place-based identity that reinforces the community's ownership and carriage of their future city.

Opportunity #1. Create and adopt a city vision that recognises water as a fundamental pillar of Townsville's current and future identity, through the full or partial adoption of the *Vision and Transition Strategy for a Water Sensitive Townsville (VTS)*.

VTS Strategy 6.1	Develop a broad city vision for Townsville that articulates the role of water in delivering the community's future aspirations – Townsville at 2050.
City Plan review	Gauge current community values, identity and ownership about Townsville's future, via a community visioning exercise, to inform the City Plan.
Corporate planning reform	Conduct a water-focused community visioning exercise as part of corporate strategic planning.

Embedding a water-centric city vision is a critical first step in transitioning to a Water Sensitive Townsville. The vision should be carefully worded and communicated to generate alignment between government, industry and the community. The associated narrative needs to tell a compelling story by, for example, linking water outcomes with other related agendas such as liveability, public health, protection of the GBR, reconciliation etc. The vision should be clearly articulated so that it is "*suitable for the common man*" and "*unarguable*", enabling it to transcend politicking. The development of the vision should also consider implementation mechanisms, such as the availability of funding streams to deliver related programs and actions, and measurable targets to track progress.

¹ At 30 June 2018, 22,874 boats were registered in Townsville (Department of Transport and Main Roads, 2018) and the estimated resident population for Townsville was 194,072 persons (QGSO, 2019).

Currently, the key vision for Townsville's future appears in the **Townsville Community Plan 2011–2021**, and is embedded in the Townsville City Plan.

Townsville is the northern gateway to Queensland. Our well-built city connects people to their community, via an active lifestyle that is enjoyed by all who live and visit. We are leaders of positive environmental action. We are acclaimed for our business entrepreneurship, government enterprise, innovation, technology and cultural stewardship.

Water plays a role in many aspects of this vision, enabling community connections and active lifestyles, and supporting productivity and innovation. It is also fundamental to environmental action and cultural stewardship. By explicitly recognising water's central role in realising the community's aspirations for Townsville, the city vision raises the profile of water, supports more open and transparent public dialogue on the value of water resources, and ultimately inspires a sense of community ownership.

Revisiting the community vision themes underpinning the strategic framework of the City Plan provides one avenue for TCC to re-engage with the community. The community vision in the Townsville Community Plan was formulated in 2010 after extensive community engagement. Since then, community perspectives and values may have shifted or evolved as a result of structural changes in the past decade, such as the sluggish economic recovery since the end of the mining boom, limited job growth, the housing slump, slow population growth and recent extreme climatic events (e.g. 2019 floods and drought). The public consultation process associated with the City Plan review offers an opportunity to gauge current community values, identity and ownership about Townsville's future growth, via a community visioning exercise. The visioning exercise could be combined with a community education program about water sensitive principles, to focus on water as a resource to be valued and embraced in the community's vision for Townsville. This engagement should form part of an ongoing conversation with the community to ensure the vision remains in sync with community values over time.

4.1.2 Strategic directions and leadership

The Queensland Government's recent changes to the planning system have resulted in the new Planning Act being implemented since mid-2017. The objectives of the planning reform, in relation to advancing development outcomes and streamlining development assessment processes, have resulted in planning legislation focused on *"development, not ... planning"*. This indicates the government's shift away from emerging policy development and long-term strategic planning, having adopted a position that *"development drives planning"*. Such an approach is not unexpected following the economic downturn and the desire to stimulate development and growth in a timely manner within Queensland. However, the implications of disaster recovery, related to drought, flooding and fire, that have followed the economic downturn in recent years, requires strategic policy development and implementation to build resilience in affected urban areas for years to come. The feedback from interviewees following this legislative change indicates the interactions with state departments on policy positions had removed the *"[pressure] off various agencies taking a look forward and deciding where they want to be and how they might do that"*.

Similar limitations with state-level directives are also evident in relation to facilitating water sensitive city objectives. Queensland's legislative frameworks support the conservation and sustainable use of water resources, and environmental protection of water resources (De Sousa, Cox & Stanford, 2014). However, the wide range of legislative tools available, spread across various acts and authorities, make it difficult to regulate, monitor and consistently implement, particularly at the local level. For example, although the stormwater quality and flow objectives detailed in the SPP and informed by the EPP (Water and Wetland Biodiversity) are integrated into local planning schemes, there is often scope for variation as local governments apply the policies at different scales (Choi & McIlrath, 2016). The elevation of the SPP beyond just water quality to integrated water management could result in more consistent and effective water sensitive outcomes. Streamlining state water policy implementation at the local level by amalgamating and consolidating water policies to align their application across coastal, water quality and biodiversity issues would assist in their local application. TCC could, in association with state government, investigate misalignment of policy implementation at a regional level, based on examples of decision making and procedural duplication across policies that did not result in the desired optimal water outcomes.

Opportunity #2. Undertake gap analysis and review of water related SPP to identify misalignment of water policy directives at regional and local spatial scales.

VTs Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
City Plan review	Review water related SPP to inform state water directives and updates to the City Plan at corridor, catchment and local scales.

A lack of strategic direction and leadership is also evident at the local level. Unclear policy positions and priorities were a key constraint to consistent policy implementation and decision making, leading to conflicting or competing organisational policies. Often, it was unclear what policy or objective would take precedence at implementation stage as TCC went “back and forth” depending on community preference or politicians’ perspectives. The need to justify a policy position to get a decision was a regular frustration, which indicates a lack of policy ownership and consistency in application across TCC to achieve agreed outcomes for the city.

Similarly, it is difficult to elevate certain agendas; for example greening policies that support the retention of trees are often overtaken by the priority for roads and vehicle conveyance. This is the case for most Australian cities, although Melbourne has recently taken steps to prioritise walkability over car-dominated streets. Victoria’s desire for “*A global city of opportunity and growth*” is clearly defined in its strategic state policy **Plan Melbourne** (Department of Environment, Land, Water and Planning, 2017). The seven outcomes specified in the Plan, including “*Melbourne is a sustainable and resilient city*”, have informed local policy implementation by the City of Melbourne through its *Transport Strategy 2030* (City of Melbourne, 2019). Building on local government knowledge and practical application, the City of Melbourne has prioritised active transport and walkability and is committed to creating a safe and liveable city by reducing through traffic in the central city. The City aims to redesign streets within the city grid to improve amenity and prioritise people first, by establishing car-free streets. Visitor experience is critical to Melbourne’s status as a global destination, and as most visitors are on foot “*the quality and generosity of the walking environment is critical to our international reputation and a thriving economy*” (City of Melbourne 2019, p. 26). This position provides clear support for local policy implementation that achieves state and city priorities.

Clear strategic leadership has its foundations in well-defined vision and policy development. A lack of ownership in establishing a policy position and implementing it as a consequence of state or federal government preferences has undermined TCC’s ability to lead, influence and be responsible for its water sensitive future. The need for TCC to take ownership of WSUD and integrated water management (IWM) solutions was considered a barrier to implementing required water policy. Interviewees felt TCC must play a greater leadership role and set the benchmark for others. To rectify this approach, TCC needs to be proactive and ensure its strategic and administrative directions clearly define and prioritise water sensitive objectives and associated actions.

Opportunity #3. Establish clear prioritisation of long-term objectives to achieve the adopted vision for Townsville and ensure council decision making is consistent, transparent and holistic.

VTs Strategy 6.2	Embed Townsville’s water sensitive vision in organisational policies and plans.
Corporate Planning reform	Align strategic, administrative and funding directions to implement long-term city vision and water policy.
City Plan review	Maintain clear line of sight to city vision and water policy within City Plan.

Part of advancing clear organisational directions is to adopt a longer-term planning horizon for corporate strategy, beyond the current five-year horizon of the **Townsville City Council Corporate Plan 2020–2024**. This document is TCC’s long-term strategic document, focused on implementing key priorities and initiatives in line with the strategic asset management plan and the financial plan. Under the *Local Government Act 2009 (Qld)*, local governments in Queensland are only required to prepare corporate plans with a five-year planning horizon as part

of their system of financial management (s. 104(5)), with the clear prioritisation of policies and objectives guiding budget allocations and staff resourcing.

Before 2012, local governments were required to prepare a long-term (10-year) community plan. However, the *Local Government and Other Legislation Amendment Act 2012 (Qld)* repealed this requirement in an effort to “*cut unnecessary red tape and streamline provisions*” (Transport, Housing and Local Government Committee (THLGC) 2012, p. 11). This was despite several objections from local government councillors, as noted by the THLGC (2012, p. 11), with one councillor stating the long-term community plan “*gives a clear direction on what is valued by communities*” and that “*Wise planning is for more than five years*”. A similar position was also held by the Environmental Defenders Office of Northern Queensland, which stated that “*Community plans are a valuable tool in ensuring that local governments ‘plan’ and ‘plan best’ for the area*”.

This is in direct contrast with the approach of the New South Wales Government, which in the late 2000s revised its statutory framework for local councils to include a mandatory minimum 10-year community strategic plan, to ensure longer-term financial and infrastructure issues were comprehensively addressed (Prior & Herriman, 2010). The community strategic plan represents the highest level of strategic planning undertaken by councils, identifying community aspirations and priorities, through comprehensive community engagement, to guide council activity. As seen in the *Newcastle 2030 Community Strategic Plan*, it provides guidance for local investment, state government intervention, and council budget allocations for priority projects. This and other experiences with developing long-term strategic plans have demonstrated the feasibility of long-range planning horizons in supporting whole-of-community engagement and holistic planning (Prior & Herriman, 2010).

4.1.3 The value of water

Townsville has some of the highest household and per capita water consumption rates in Australia, using about four times more water than residents in other major cities (TCC, 2019d). Interviewees felt that cultural expectations around water promote consumptive rather than conservative behaviours, with water perceived as “*a resource to be used rather than a resource you don’t want to waste*”. This was not always the case. For example, interviewees noted that historically, the Townsville community did not hold expectations for green lawns all year round, instead allowing vegetation to die off during the dry season and “*come to life again*” during the wet season. However, at the turn of the century, a ‘Greening Townsville’ agenda was pursued to attract and retain residents, leading to the installation of irrigation systems throughout the city and surrounding suburbs. Politicians continue to endorse this agenda through promises to “*Never have Brownsville again*”, “*Never run out of water*”, “*You can keep your gardens green*” instead of promoting open and honest public discussions about the true value of water.

These expectations are further entrenched in key planning and pricing instruments. The LGIP under Part 4 of the Townsville City Plan sets out the desired standards of service for trunk infrastructure, with TCC adopting water supply standards that support a staggering average daily consumption of 600 L/EP/day. In contrast, the City of Gold Coast recently adopted water supply standards that provide for an average demand of 190 L/EP/day in its 2016–2041 planning horizon, and 170 L/EP/day in the 2066 planning horizon (City of Gold Coast, 2019). Townsville Water remains one of the only water providers in Australia that has not moved to consumption-based water pricing (Cruse et al., 2015), retaining a water allowance per customer amounting to 772 kL/year in 2019–20 (TCC, 2020). Over time, this ‘allowance’ has reinforced a “*sense of entitlement*” and expectation that water will always be available for consumption. Accordingly, anything that threatens this ‘entitlement’, such as water restrictions or the introduction of different water pricing structures, tends to generate highly emotive and vocal public debate, resulting in the defeat of suggested policy changes before any reasonable discussion with the community about the cost and value of water can be held.

In the context of population growth, increasing rainfall variability and climatic uncertainty, it will become more important for civic leaders and the community to engage in a dialogue about the value of water and its role in Townsville’s future. Given the highly emotive nature of this topic, extensive and well-designed community engagement and education programs should precede and accompany any water reforms package. Limited efforts in this regard will likely lead to community opposition, as occurred in 2010 when TCC attempted to introduce a uniform two-part tariff for all customers. The public backlash coupled with a lack of state-level support, with the Queensland Government advising TCC that it was not required to adjust its tariff regime, led TCC to revert back to its original ‘optional’ two-part tariff and ‘standard’ allowance-based charging structure (Cruse et al., 2015; Water

Services Association of Australia, 2010). To avoid a similar outcome in the future, TCC will need to carefully consider how it communicates and introduces price changes, in addition to securing state-level backing. Desired standards of service under the LGIP should also be revisited as part of a staged reform process.

Opportunity #4. Develop a water pricing strategy that explores alternative pricing options and pathways that are appropriate for Townsville. Ensure community engagement and education programs are included in pricing reform packages, along with state-level support.

VTs Strategy 2.1	Examine and evaluate evidence about the need for flexibility and choice in delivering water system services, including infrastructure and pricing options.
Corporate Planning reform	Provide administrative directions to introduce and implement a water pricing reforms package.
City Plan review	Reduce desired standards of service for trunk water supply infrastructure in next LGIP.

4.1.4 WSUD in the unique dry tropics environment

Townsville’s unique climatic and environmental conditions associated with its location in the dry tropics has led to some debate about the appropriateness of WSUD, particularly relating to stormwater treatment. Many of these infrastructure solutions were developed in the temperate climates of south-east Australia, where rainfall is more consistent throughout the year. In contrast, Townsville has a dry tropical climate characterised by a wet season (hot and humid summer months from November to April), and a dry season (warm winter months from May to October), with an average maximum temperature of 29°C (Bureau of Meteorology, 2020). The average annual rainfall is 1136 mm, most of which falls over 65 days during the wet season as short sudden downpours associated with monsoon troughs and cyclonic or semi-cyclonic activity (Bureau of Meteorology, 2020). Sodic clay soils are the dominant soil type, which can become very hard during the dry season and waterlogged during the wet season. Other points of difference include vegetation, which tends to grow quite rapidly after rainfall events, and the presence of mosquitoes that can spread the Ross River Virus, Barmah Forest Virus and Dengue Fever. All of these factors (weather extremes, poor soil, rapid vegetation, and mosquito borne diseases) need to be considered in the local design and implementation of WSUD infrastructure. This includes the sizing and placement of infrastructure, species selection and maintenance programs, and the creation of habitats for mosquito predators, among other things.

A range of WSUD solutions have been applied in Townsville, and product guides tailored to Townsville’s conditions currently exist. Yet the interviews revealed some disagreement about the perceived effectiveness of WSUD, and the most appropriate solutions for the dry tropics. For example, some interviewees felt that long dry spells would render rainwater tanks to harvest and store water for irrigation ineffective, and costly when combined with irrigation systems. However, others felt rainwater tanks would generate significant storage capacity, reducing flood risk and the need for government investment in flood detention infrastructure. Similarly, interviewees disagreed over the appropriateness of end-of-pipe versus distributed solutions, with some questioning the effectiveness of distributed bioretention systems and preferring large constructed wetlands. Others highlighted the significant maintenance burden of wetlands and preferred distributed systems.

The differing perspectives, particularly among developers and local government practitioners, highlight a lack of shared, sector-wide understanding or alignment of water sensitive practices and outcomes for Townsville. Some interviewees suggested further investigations of WSUD solutions that suit Townsville’s local conditions. Interviewees highlighted particular research needs, such as different planting palettes for bioretention basins, urban forest interventions to maximise urban cooling, and economic studies to uncover the true costs and benefits of WSUD. Discussions with interviewees and a survey of available documentation indicates a relevant body of work already exists, including localised tropical and WSUD research, commissioned studies, and trials/demonstrations of WSUD solutions, such as passively irrigated street trees. So, while new research may be required, we recommend TCC invest in and promote more widespread knowledge sharing by developing standards and guidelines, supported by training and capacity building programs. These tools and programs should address the full life cycle of different solutions, providing guidance on design and construction, through to access and maintenance. Lessons from past implementation successes and failures should also be shared.

Opportunity #5. Champion the development of local WSUD solutions for the dry tropics by supporting ongoing research, becoming a knowledge broker, and leading by example.

VTs Strategy 2.4	Develop new knowledge about design and maintenance of green infrastructure in the dry tropics.
VTs Strategy 2.6	Implement significant demonstrations of adaptive infrastructure, incorporating a learning agenda and linking to a broader narrative that emphasises the importance of such approaches.
Corporate Planning reform	Identify, commit to and implement a range of council-wide actions that support the adoption of locally appropriate WSUD solutions and practices, including developing capacity building programs and research collaborations with local universities.

Taking on the role of knowledge broker should form part of TCC's greater leadership strategy. Interviewees felt that if WSUD is to become business as usual, then TCC needs to lead the way, not only by supporting capacity building, but through concrete action. TCC needs to embed WSUD in everyday activities, such as street upgrades, as well as raise awareness of new or different approaches through trials and demonstrations. It was felt that TCC should take more ownership of the water sensitive agenda and *"buy in to this itself and accept some of the risk that it is taking on"*. As a public good agenda, *"you can't expect developers to lead the charge"* and since *"everyone looks to council to lead the way"*, it is important for TCC to step up and move away from the current approach of *"do what we tell you, not what we do"*.

The economic and property downturn provides a unique opportunity for TCC to demonstrate such leadership, by redefining what development should look like in Townsville. For example, the *Townsville 2020* masterplan has identified investment opportunities within the CBD and along Townsville's waterfront, including projects endorsed and funded in part or wholly by TCC and state government. These priority projects represent an opportunity for TCC to implement innovation in urban design and IWM solutions, which in turn can educate both the community and the development industry on holistic water solutions. The diversity of these projects—a combination of open space plans, landscaped entry statements, water parks and pedestrian connections—provide great prospects for alternative water solutions. High profile sites can set the benchmark for future development in Townsville, provided they are supported by an overarching policy position on water (Opportunities #1 and #3) and form part of a broader holistic approach to trunk and WSUD infrastructure.

4.2 Strengthening water outcomes in the Townsville City Plan

4.2.1 Expanding water-related provisions

The Townsville City Plan includes provisions related to water quality, maintaining healthy waterways and implementing WSUD through development codes and the Development manual PSP. Development assessment benchmarks are expected to be implemented via performance outcomes in association with some specified acceptable outcomes. These benchmarks are supported by design and construction standards, and guidance for development. All these provisions seek to ensure that development manages stormwater and wastewater as part of the 'integrated total water cycle'. However, concerns were raised about the limited focus of water-related provisions in the City Plan, given both the assessment benchmarks and WSUD guidelines predominantly focus on water quality. It was generally considered that the City Plan is *"segmented or siloed in terms of looking at the water cycle as a whole"* and does not adequately encourage making the most use of water (e.g. water recycling).

This segmentation is further reinforced by state planning and policy instruments. The SPP separates state interests relating to water supply and water quality, with policies organised under the themes of 'Infrastructure' and 'Environment and heritage', respectively. Similarly, removing the mandatory requirements for councils to prepare and implement Total Water Cycle Management Plans shifted the focus away from a holistic consideration of a diverse range of water sources and issues, and further entrenched a stormwater-centric view of WSUD.

To implement water sensitive development within greenfield scenarios in Townsville, the City Plan must represent an integrated approach to water. This should include support and encouragement for the use of alternative water sources via integrated water systems. Greenfield developments maximise opportunities to deliver IWM due to land ownership, service infrastructure provision and the spatial scale of developments. Consequently, the consideration of IWM must form a defining component in the conceptual and urban design stage of greenfield planning, to integrate water into Townsville’s future urban landscape.

As ‘preliminary approvals’ are in place across most greenfield sites in Townsville, updates to the City Plan may have limited impact because agreement has already been reached on WSUD provisions for each development. However, these ‘preliminary approvals’ generally defer to the City Plan in regard to engineering solutions as specified in the Development manual PSP. Opportunities exist to influence and direct water sensitive solutions through the Development manual PSP by expanding the scope of provisions beyond just stormwater management, and ensuring consistency of application across all levels of provisions within the City Plan.

Opportunity #6. Expand WSUD provisions to incorporate IWM outcomes.

VTs Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
Corporate Planning reform	Incorporate IWM into strategic directions and funding allocations to facilitate holistic water cycle solutions for Townsville.
City Plan review	Update the City Plan to expand the scope of water-related provisions beyond stormwater at all levels, from the Strategic Framework through to Development manual PSP. Ensure related provisions across the scheme complement, rather than duplicate, one another.

In Victoria, this approach to IWM has been successful through the Victorian Planning Provisions. Clause 56.07 of each Local Planning Scheme requires the implementation of IWM as part of all residential subdivisions (see Figure 13). The Victorian example highlights that mandating policy is acceptable to the development industry where it is applied consistently and maintains a level playing field for all developers within the market.

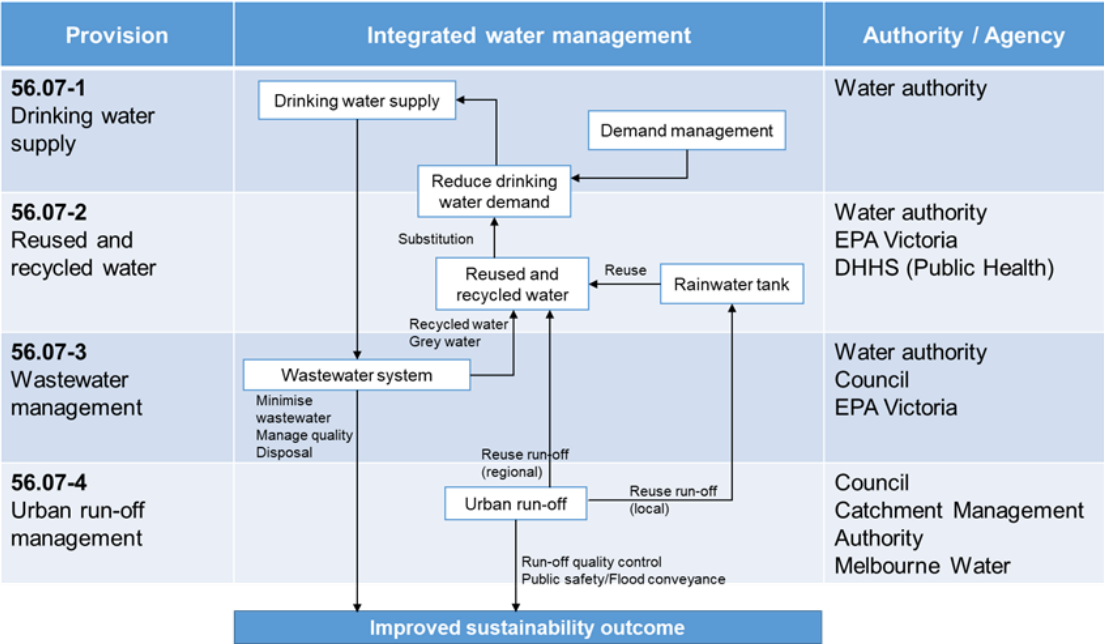


Figure 13. Overview of Victorian Planning Provisions clause 56.07 (integrated water management), as an example of mandated IWM policy. (Source: Department of Sustainability and Environment 2006, Figure 1, p. 3.)

4.2.2 Improving implementation: performance-based or prescriptive planning?

Practitioners interviewed highlighted an ongoing tension between performance-based and prescriptive planning approaches within the City Plan. The City Plan sets minimum requirements that must be met (i.e. stormwater quality targets) but offers developers flexibility in *how* they are met. In other words, “*developers have to do it, but how they do it is up to them*”. This is thought to encourage innovation. However, while interviewees recognised the potential for innovation, in reality developers simply “*want to be told what to do*” to facilitate timely decision making. Given the varied landscapes within Townsville, a performance-based planning approach that encourages contextual urban design is ideal, if a broad range of professions are skilled and motivated to go beyond minimum standards. However, a prescriptive approach was seen as more efficient and appropriate in Townsville given the limited expertise, knowledge and capabilities around IWM in the broader development sector.

Recent research by Bhoge et al. (2019) on non-binding sub-tropical design policy introduced by Brisbane City Council highlights the trade-offs between performance-based and prescriptive planning approaches. The authors recognise the need for guidelines to provide some level of flexibility to enable site-specific solutions, but they also emphasise the importance of clarity in scope and language to prevent ambiguous or conflicting interpretations that allow developers to avoid compliance. They concluded discretionary, performance-based planning in Queensland has not been effective. Rather than promoting sustainable forms of urban development, it has allowed opportunity-led planning, thereby removing stakeholder certainty in planning processes and outcomes, and undermining public trust in the planning system. Instead, the authors advocate for strong ‘design, execute and maintain’ policies at the local government level to achieve desired outcomes.

This ‘design, execute and maintain’ approach to policy implementation leads to clearly defined design solutions as a result of prescriptive tools such as setbacks, heights and minimal standards. These design tools are generally quantitative and easily defined diagrammatically so that they are broadly understood by the industry and the community. While this approach may be considered blunt and restrictive, it is most effective for implementing new policy, particularly where professional and community knowledge and experience is still evolving. This approach supports acceptance and consistency in application, by eliminating officer interpretation and/or preference in design solutions. It also streamlines decision making processes and provides certainty to the development industry through clearly defined provisions that are easily complied with. Once the industry is able to consistently deliver IWM in greenfield developments, and achieve the desired benchmarks, the number of performance-based provisions within the planning scheme can be increased to promote further innovation.

Opportunity #7. Incorporate prescriptive planning provisions for IWM to streamline decision making and achieve consistent water and infrastructure assets.

VTs Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
Corporate Planning reform	Highlight a streamlined planning process that supports strong market conditions within Townsville due to the adoption of ‘design, execute and maintain’ planning policies.
City Plan review	Update the City Plan as part of the planning scheme review to adopt a prescriptive planning approach, through mandatory provisions on IWM, to achieve streamlined decision making.

The issue of implementation is not just confined to the performance-based nature of planning provisions. Enforcing relevant requirements is important, as is maintaining and managing constructed assets. Regarding the latter, interviewees highlighted the constraints on TCC in regularly maintaining public open space and WSUD assets. Developers are required to follow strict standards for constructing and maintaining assets until they are handed over (two-year period) to TCC. Yet after handover, TCC undertakes very little maintenance or performance monitoring, with work crews struggling to keep up with maintaining parklands, much less bioretention basins and other smaller WSUD assets. This issue is further complicated by occupational health and safety concerns, with work crews unlikely to enter damp or reeded areas during the wet season.

Ensuring adequate ongoing resourcing for the many assets that TCC is expected to maintain reflects the evolving role of local government and is not unique to Queensland. Interviewees indicated the maintenance budget is one of the first to be cut when TCC budgets are tight. This situation reinforces the need to clearly prioritise WSUD related policies and objectives at the strategic level (Opportunities #1 and #3), to ensure resourcing allocations at operational levels are sufficient and not compromised by austerity measures.

4.2.3 Strategic greenfields planning

A prescriptive planning scheme—made up of clearly defined outputs, mandated targets and requirements—is best adopted and applied in association with a well-defined strategic vision and a framework for implementation. In regard to greenfield development within Townsville, significant land supply remains within the City Plan’s urban footprint under the Emerging Community Zone. Because this land is currently zoned for urban purposes, with general land uses having been allocated through the preliminary approval process, TCC has the opportunity to consolidate these preliminary approvals to forward plan their growth areas through gaps analysis. As previous planning decisions will influence Townsville’s development for years to come, opportunities exist to highlight deficiencies across these developments at a corridor or network level to enable change from the ‘bottom up’ at the subdivision stage.

In association with government agencies and the development industry, corridor plans for the three growth fronts (north, west and south) could be established to reflect preliminary approvals and integrate network planning. This approach would then enable gaps to be identified and site-specific actions to be implemented to achieve IWM and focus TCC resources on achievable outcomes, within a legacy context. These corridor plans should reflect both current and future network planning for land use, intermodal hubs, housing density and infrastructure delivery (i.e. water, roads, transport, schools, heritage, vegetation, open space and community facilities), based on population projections and strategic growth policies.

The recently adopted NQRP specifies a number of strategic policies that require local implementation within Townsville as the emerging capital of the region (see section 2.2). TCC is the lead authority to maintain and direct land supply within the Townsville Urban Area with specific ‘Measures that matter’ related to increasing housing diversity through more medium density housing stock, and increasing transport modal share across Townsville and surrounding regions. The numerous policies within the NQRP can be implemented through strategic corridor planning across Townsville’s three growth fronts. This would provide an opportunity to engage with state agencies and the development industry to facilitate orderly planning of blue, green and grey infrastructure, financing and delivery. Such an approach to growth planning would help contextualise regional level policies to Townsville, which is difficult to achieve if planning is reactive or ad hoc.

Directing its greenfield development through corridor planning at a strategic level means TCC can define the parameters for both urban development and infrastructure rollout across growth zones. Interviewees suggested allocating more resources to forward planning to “*facilitate the right thing in the right place in the right manner*”. By targeting specific actions and/or refining boundaries for development within the Emerging Community Zone, TCC can guide and deliver holistic IWM at a corridor scale and direct IWM outcomes at the local subdivision scale.

Opportunity #8. Facilitate corridor planning across the three growth areas to integrate green/blue corridors and grey infrastructure, and facilitate IWM in a cost-efficient and resilient manner.

VTs Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
Corporate Planning reform	Include corridor planning as part of TCC’s approach to regional greenfield growth.
City Plan review	Incorporate corridor plans into the City Plan’s Strategic framework, under a Shaping Townsville theme, as a means of implementing the NQRP and IWM for greenfield development.

Preparing and implementing catchment-scale drainage strategies is one opportunity for guiding holistic IWM. As an integrated entity, TCC/Townsville Water can develop and incorporate drainage strategies as part of each corridor plan. Each strategy could include functional designs of relevant infrastructure (i.e. pipelines, overland flow paths, retarding basins, wetlands, floodways, and other drainage and water quality treatment measures) required to service urban growth within a catchment area. Melbourne Water uses such strategies (known as development services schemes or DSS) to plan the stormwater and waterway related infrastructure for new urban development in Melbourne's growth zones. Planning at the catchment scale, as opposed to the precinct or subdivision scale, enables optimised infrastructure performance (for flood protection, water quality and waterway health) and the appropriate sharing of infrastructure costs across multiple landowners/developers in the Scheme area.

Similar to Melbourne Water's DSS, TCC's drainage strategies could include a pricing arrangement that determines the developer contributions required to fund drainage and stormwater treatment works. Melbourne Water requires all developable properties to pay a drainage contribution based on the size and type of development. Contributions include a hydraulic component to fund drainage and flood protection works, and a water quality component to fund water quality treatment works (Melbourne Water, 2017). These contributions are used to reimburse the developers that construct the scheme works according to the DSS functional design. Developers that adopt innovations, such as lot scale or street scale WSUD measures, can have DSS contributions reduced based on the performance of their onsite measures.

This approach to drainage strategies ensures infrastructure is (a) constructed where it can deliver the best performance outcomes, and (b) funded equitably. The contributions model is appealing to developers because of the potential cost savings generated through economies of scale. This is particularly important in Townsville given the relatively small greenfield housing market. Interviewees highlighted the limited ability to recover development costs through land sales, noting *"there's no money in the land"*. Accordingly, any infrastructure that consumes net developable area to treat stormwater becomes cost prohibitive. They suggested a network approach to stormwater management, to generate *"more efficient ways to treat water, rather than little, bespoke 'pads' across a project"*. The development industry's aversion to deliver stormwater solutions through small-scale and isolated greenfield developments, due to additional cost or otherwise, implies a larger-scale integrated approach to planning and funding stormwater quality treatment works may be warranted.

To ensure delivery of desired water assets and infrastructure, a tailored approach to water quality offsets could also be beneficial, provided these offsets are transparent and adequately supported by adopted network implementation plans and associated costings. An example is the Ipswich City Council Planning Scheme which, through Implementation Guideline No. 24 (Stormwater Management), provides objectives that developments must achieve, including the option for a **Voluntary Water Quality Nutrient Offset Payment** in lieu of works being completed on the site or within the development (Bligh Tanner, 2016).

Interviewees indicated TCC is currently developing a regional water quality management strategy to give developers options for achieving water quality targets through onsite works or via an offset. Developers support the proposed offsets scheme because it offers a cost-effective and practical solution to delivering water sensitive outcomes. It also enables TCC to take a strategic approach to water quality improvements by implementing the best mix of infrastructure solutions across the broader catchment area. However, the strategy is still in development and tools to quantify what those offsets should be, and an associated works program, are still being prepared. In addition, costing and financial mechanisms, management systems and decision making processes all need to be put in place (along with technical guidelines) so TCC can be 'business ready' when offsets are proposed as part of a development. Interviewees recognised that, if appropriately implemented, *"this scheme will allow council to have more efficient, fit-for-purpose solutions that achieve the desired outcomes"*.

Opportunity #9. Implement a water quality offsets scheme to support cost efficiencies in infrastructure delivery and asset management. Consider piloting a small-scale water quality offsets scheme before rolling out across the local government area.

VTs Strategy 3.3	Develop a strategic and catchment-wide approach to managing urban runoff and protecting waterways and riparian zones, building on the existing Reef 2050 Water Quality Improvement Plan.
Corporate Planning reform	Provide administrative directions to implement an offsets scheme to deliver drainage and stormwater quality treatment works.
City Plan review	Provide a water quality offsets scheme as part of a planning scheme policy, which may be separate to the City Plan due to statutory caps on charging rates that limit the inclusion of stormwater as trunk infrastructure in the LGIP.

Recent changes to Reef protection regulations provide additional impetus to introduce an offsets scheme. The amendments under the *Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Act 2019 (Qld)* seek to ensure new development does not exacerbate nutrient or sediment pollutant loads. Notably, all regulated industrial land use activities within the Reef region, such as sewage and water treatment plants, must meet new discharge standards from 1 December 2020. If the standards cannot be achieved through design or operating conditions, the *Point Source Water Quality Offsets Policy* will guide what offsets can be used to avoid a net residual impact (Department of Environment and Science, 2019b). TCC recognises the potential for this policy to provide a framework for offsetting water quality pollutants, with opportunities to target both point source and diffuse source pollutants. This change opens up a range of possible solutions for delivering water quality improvements. Using riparian restoration measures and improved land management practices, along with WSUD infrastructure, allows for multiple benefits beyond improved water quality, such as reduced localised flood peak, improved amenity, land productivity and liveability. These solutions can be deployed throughout rural, urban and greenfield areas, as opposed to just end-of-pipe solutions. Further efforts are required to explore optimal governance and financing arrangements for the offsets scheme and related programs.

4.2.4 Housing, context and place

Like most cities, Townsville's built form varies as a result of different periods of development (Figure 14). Generally, newer suburbs are characterised by smaller lot sizes, featuring single-storey, slab-on-ground dwellings that occupy a large proportion of the lot. These housing typologies are quite homogenous and constructed by volume builders in a standardised way across most parts of Australia. In contrast, Townsville's established areas feature larger lots, with elevated single-storey dwellings that incorporate shaded facades and understorey areas with generous private yards. This type of housing is contextualised to local environmental and climatic conditions, embedding resilience through design by accommodating floodwaters with minimal property damage and enabling cross-ventilation to provide more comfortable living spaces during extreme heat conditions. Projected increases in climatic variability and extremes associated with climate change highlight the need for more adaptive forms of housing in greenfield areas, like traditional Queenslanders that reflect local tropical conditions and landform constraints. Yet Townsville's prevailing built form demonstrates a lack of contextual design, with Pure Projects (2017) finding very limited tropical architecture that reflects Townsville's dry tropical locality, enhances its liveability and reinforces its sense of place.

The Queensland housing type, a single detached wooden house with a corrugated iron roof and a distinctive internal layout, originated in the 1850s. Timber was readily available across the state, while iron was easy to transport long distances and found to be more durable in Queensland's tropical climate than roof tiles (Museum of Tropical Queensland, n.d.). These materials made it easy to construct a home that was elevated to control and monitor termite activity from ground level. It could be constructed across various terrains—gentle slopes, steep inclines and flat land—without ground level disturbance. Its elevated form also afforded benefits for the tropical climate, such as enhanced ventilation of both the house and its understorey, cool microclimates through shaded outdoor living spaces at house level and below, and an unobstructed path for floodwaters.



Figure 14. Comparison of built form in Townsville's new (left) and established (right) urban areas. The image on the right illustrates a range of tropical design features.

Detached dwellings and duplex housing are generally controlled in accordance with the QDC (Business Queensland, 2019). The QDC directs the siting and positioning of a house on a single lot and forms the prevalent type of housing within greenfield developments. The mandated provisions control setbacks, height, site coverage, wall length, window placement and car parking, and enable detached housing to be developed on a single lot through the Building Approval process. Future updates to the QDC, through the Queensland Housing Code and Model Code for Neighbourhood Design, seek to incorporate requirements for smaller lots that support affordable housing options and are integrated with subdivision standards, promoting better urban design across Queensland.

This streamlined and consistent approach to developing detached dwellings and associated outbuildings across Queensland facilitates efficient and timely housing construction. However, this approach does not restrict building materials, the design or the style of housing. Rather, it creates a box in which a house can be sited without requiring further approvals. It does not limit the ability to develop fit-for-purpose housing that responds to local climatic conditions and is distinctly Queensland or 'Townsvillian'. Opportunities exist to work with the local development industry to create housing designs that are distinct to Townsville and have greater housing appeal, particularly to the broader Australian housing market, because this provides a point of difference that embeds the desirable 'dry tropical' lifestyle that attracts people to live in Townsville.

Through careful design focused on performance of the dwelling for residents, the desired climatic and water benefits enabled by traditional 'Queenslander' housing can be achieved, even if the style and materials differ from traditional approaches. For example, parking garages or carports can provide cool, shaded and cross-ventilated outdoor living spaces if they are designed with flexibility in mind. Raised dwellings provide benefits in coping with floods, as can the use of flood-resilient materials and details at lower levels. Other critical considerations include providing deep root zones for planting around the house for canopy shade and cooling, which is not typical practice for greenfield development. Examples of contextual climatic and water sensitive housing designs can be seen in the CRCWSC's *Typologies Catalogue*, developed by London et al. (2020). It provides a range of housing typologies, at densities and configurations relevant to Australian cities and applicable to different contemporary infill development scenarios in South Australia, Western Australia and Queensland. A similar guideline document could be developed for greenfield residential development in Townsville.

Design guidance at the state level recently reaffirmed the importance of 'Queenslander character' in contemporary urban design. QDesign stresses the importance of "*design [that] continues to be reflective of not only the local climate but of the building traditions, materials and styles that have shaped the Queensland identity*" (Queensland Government 2018, p. 9). This is often understood as purely stylistic advice. However, for a water sensitive cities' approach, it also needs to be considered in performative terms, incorporating aspects of liveability and passive design as mentioned above. Given the diversity of landscapes across Queensland, state-level policies and guidance must be contextualised to account for local conditions. In Townsville, the dry tropical climate and ecologically sensitive environments pose unique considerations for the design of the built form. TCC is currently considering the opportunity to formulate a 'TDesign' document to provide design guidance that accounts for Townsville's local conditions. Some design principles and elements have been proposed in the

companion report, *Ideas for Townsville: Greening the public realm in a dry tropics city* (CRCWSC, 2020). As a fit-for-purpose design policy and standards, TCC could include TDesign as a Development code within the City Plan to ensure locally contextual design is a key consideration. These design principles could be demonstrated in the private and public realm through collaborative pilot projects between TCC and the development industry. Appropriate resource allocations will be required to deliver such trials.

Opportunity #10. Implement locally specific housing design by developing fit-for-purpose design policy (TDesign) within the City Plan. Collaborate with the development industry to pilot projects that demonstrate TDesign principles.

VTS Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
Corporate Planning reform	Incorporate contextual Townsville identity through urban design and built form objectives for the City of Townsville. Support policy implementation through adequate budget allocations (to fund, for example, pilot projects and support stakeholder engagement), and ongoing monitoring and reporting.
City Plan review	Prepare and incorporate TDesign policy and requirements into the City Plan as a Development code.

Under the current Townsville City Plan, all standards for designing and constructing development infrastructure sit within SC6.4 Development manual PSP. As incorporated documents, any changes will require amending the planning scheme policy, which can be a time-consuming process. In contrast to land use planning and urban design provisions, associated standards detailing engineering and construction methods are not integral parts of the City Plan and could arguably be referenced as external standards to reduce the time and cost of introducing changes. Longstanding Australian engineering standards developed by a recognised authority, with widespread industry and public acceptance, such as the Australian Standards and the Queensland Urban Drainage Manual, are typically not required to be incorporated in their entirety within a planning scheme.

Guidance on WSUD needs to be regularly updated as new information becomes available and practices evolve, but this can be difficult to do through the planning scheme amendment process. Given this, one suggestion is to separate design and construction standards from the City Plan to enable more timely revisions and “*agile practices*”. This approach is used in other states. For example, in Victoria, clause 56.07 of the Victorian Planning Provisions requires stormwater management systems to be designed to meet the current best practice performance objectives for stormwater quality contained in the *Urban Stormwater – Best Practice Environmental Management Guidelines*. These guidelines contain quantitative standards for stormwater pollutant removal, and outline methods to demonstrate compliance. As they sit separately to local planning schemes, they can be regularly updated without requiring planning amendments. This separation does not affect compliance, because the guidelines are specifically called up within a mandatory planning provision.

On the other hand, specifying standards in the City Plan provides greater certainty and simplicity of operation. External standards, as additional documents, can be more challenging to monitor and maintain, introducing uncertainty through issues with version control. Further, not all standards can be separated from the City Plan. While externally produced documents can be referenced separately to the City Plan, the Planning Act requires internal council documents to be incorporated in the planning scheme. Accordingly, further efforts will be required to explore which standards can and should be separated from the City Plan, as well as the appropriate wording of scheme provisions to ensure they are clear and enforceable. Additionally, or as an alternative, TCC could explore how to streamline current amendment processes for the Development manual PSP to facilitate timely and flexible revisions. While the process for amending a PSP like the Development manual must conform to the Minister’s Guidelines and Rules, internal communication and consultation processes could be improved to facilitate timely revisions.

Opportunity #11. Streamline amendment processes for design and construction standards within the City Plan to facilitate timely and flexible revisions as understandings and practices evolve.

VTs Strategy 1.6	Strengthen the effectiveness of the City Plan in supporting the water sensitive city vision by linking it to the overarching narrative and business case for quality urban space solutions supported by water sensitive design principles.
City Plan review	Streamline and socialise amendment processes for design and construction standards.

4.3 Integrating council functions

4.3.1 Townsville Water and Townsville City Council

Townsville Water is a business unit within TCC that provides water and wastewater services. In the past, this servicing authority existed at arm's length from council, as a separate entity known as North Queensland Water. However, after the 2007 local government amalgamations, the water servicing functions and responsibilities were absorbed into the new TCC. Organisational restructures since then have further reduced the separation of functions between TCC and the water servicing authority. This evolution has been accompanied by a reduction in the scope of Townsville Water's roles and responsibilities, such that Townsville Water has effectively become an "*operational entity*" focused on the delivery of water supply and wastewater services. Notably, water infrastructure planning, strategic water planning and asset management are undertaken by other parts of TCC. The Infrastructure Planning Unit is custodian of the integrated water supply strategy and functions as the "*interface*" between Townsville Water and Planning Services.

Townsville Water's incorporation into TCC appears to have diminished the scope for visionary and long-term strategic water planning. As a unit within TCC, Townsville Water's activities are significantly influenced by short-term political cycles. It was suggested that separating Townsville Water from TCC would enable it to "*take over*" relevant water infrastructure planning and asset management functions currently undertaken by other parts of TCC, and conduct comprehensive and strategic water planning over longer horizons.

Urban water reform in Australia over the past few decades has separated ownership, policy making, service delivery and regulatory functions, with water utilities established as corporate entities that operate at arm's length to government. In Victoria, long-term planning for water demand, supply and security is a legislated requirement. For example, the *Melbourne Water System Strategy* and *Melbourne Sewerage Strategy* are 50-year strategies that set the direction for Greater Melbourne's water resources (rainwater, stormwater and recycled water) and sewerage systems. As a separate corporate entity, Townsville Water would be able to operate outside political cycles, with the relevant functions and capacities to undertake longer-term, strategic water planning that considers a broader range of factors.

On the other hand, Townsville's current structure, as an integrated entity, has significant advantages. The urban water industry increasingly understands it plays a fundamental role in creating liveable urban centres (Water Services Association of Australia, 2014). Beyond providing essential water services (water supply, sewerage and drainage), the water sector increasingly accepts it must also help provide 'less critical' services such as urban amenity, recreation and community connection (Furlong et al., 2017). This task requires a place-based approach to land use planning and urban water management, which is arguably easier to undertake as an integrated entity. TCC's ability to control all aspects of water governance—from making by-laws, strategy and policy, through to planning, regulation and service delivery—could, if harnessed appropriately, provide a highly enabling environment for policy and practice change. In its current form, TCC/Townsville Water is in a strong position to undertake integrated urban and water planning and service delivery. However, the effectiveness of the current distribution of functions and integration across TCC needs to be better understood, with further efforts to diagnose and improve organisational performance if TCC is to realise its full potential as an integrated entity.

Opportunity #12. Adopt an integrated focus to planning and delivering long-term, strategic water outcomes.

VTs Strategy 6.4	Explore and pilot solutions for collaborative and integrated governance approaches that will deliver the broad city vision, beyond issue-specific solutions.
Corporate Planning reform	Identify and support an improved governance model that enables council divisions to better engage and contribute to strategic planning functions. This may include structural and non-structural solutions that ensure decision making and policy development is not carried out in an isolated manner.

In recent times, strategic water planning for Townsville has involved significant intervention by federal and state governments, and focused quite strongly on water security. For example, the Townsville Water Security Taskforce was appointed by the Australian and Queensland governments, along with TCC, to investigate short-, medium- and long-term water security solutions for Townsville. These solutions have informed TCC's three-point water security plan currently being implemented. Alongside this program of activity sits the Integrated Water Supply Strategy (IWSS) prepared by the Infrastructure Planning Unit, which is the key strategic planning document for water supply. The IWSS provides an avenue for total water cycle planning at the strategic level, allowing for fit-for-purpose alternative water supplies, demand management, and WSUD, among other things. Trunk infrastructure planning via the LGIP is a subset of strategic water planning. The LGIP identifies the trunk water and sewerage infrastructure required to service urban growth within a 15-year planning horizon. Stormwater networks are planned and managed separately to the LGIP. The LGIP informs the TCC's long-term financial plan and capital works program. The plan is reviewed annually to reflect changing assumptions around population growth and water demand.

The IWSS and LGIP provide two clear instruments for strategic water planning at the local level. However, recent federal and state interventions via the Townsville Water Security Taskforce suggest a gap in TCC's long-term strategic water planning. Accordingly, the scope of such planning may need to be more clearly defined and agreed upon by all stakeholders, including roles and responsibilities, and mechanisms for widespread consultation with internal and external stakeholders. The latter will be critical to ensure the strategic exercise generates alignment and ownership of the strategy across TCC. This process of (re)defining strategic water planning provides an opportunity to expand the scope of activities to support integrated water service provision, and maximise opportunities across the total water cycle. This expanded scope may include considering drainage infrastructure alongside water supply and sewerage infrastructure in the LGIP, although the implications of statutory caps on infrastructure charges will require further investigation. It may also enable a greater focus on nature-based solutions, and long-term planning that integrates broader outcomes such as improving waterway health, urban cooling, flood management and groundwater recharge. Because Townsville Water is responsible for water supply, sewerage and now recycled water, with stormwater planning and waterway health (Creek to Coral) located in the same directorate, it is well-placed to champion, in partnership with Planning Services, strategic water planning activities that advance more holistic water outcomes.

4.3.2 Departmental silos

Interviewees identified siloed council operations as a key structural constraint on innovation. Place-based, water sensitive outcomes require input from a range of professionals (e.g. engineers, landscape architects and planners) across different parts of council. Yet the departmentalised structure of local government is geared towards delivering specific services and outputs (e.g. licensing, permits) rather than strategic outcomes (e.g. climate adaptation, liveable communities) that require cross-sectoral integration (Gillen, 2004). Interviewees were critical of the organisational divides within TCC, noting functions are often undertaken in isolation with very little opportunity to enable the "*cross-pollination of ideas*" across different departments. This siloed approach can lead to negative outcomes for local amenity and liveability. For example, street trees with expansive canopies are particularly important for mitigating the urban heat island effect, yet they may be perceived to create safety risks or interfere with underground services. These issues can lead to street tree selection and/or placement that diminish potential liveability benefits.

While integrative mechanisms do not currently exist to coordinate day-to-day activities across TCC, interviewees described some ad hoc, issue or project specific collaborations between different parts of council. Large

infrastructure projects, such as a major pipeline and other “*big ticket items*”, provide a basis for bridging functional silos. New strategy or policy development often involves extensive collaboration between the planning and water servicing units. Similarly, in periods of crisis (e.g. 2019 floods) different professions and functional areas are brought together to facilitate a coordinated response. However, once the crisis or purpose for collaboration ends, it is very difficult to “*ensure those ongoing conversations*” and prevent reversion to business as usual. Interviewees noted that while TCC encourages collaboration, the reality is “*probably a bit more based in the rhetoric*”. There appears to be very little appetite for integrated activity when it comes to implementing WSUD, particularly as this aspect of water “*isn’t visible*”, often “*not politically palatable*” and tends to go “*under the radar*”.

External perspectives also confirmed functional silos, particularly when it came to development assessment. While the Development Assessment teams are supported by discipline-oriented units, such as Assets and Hydraulics, cross-sectoral collaboration typically occurs only when there is a problem to solve. Most meetings associated with a specific development are designed to work through particular issues rather than “*seek to drive good outcomes*”. Similarly, out-of-sequence development often drives extensive collaboration, both internally and externally. These examples highlight the reactive nature of collaboration, designed to resolve issues rather than proactively steer innovation. In some instances, innovation-driven collaboration between different parts of TCC and developers may occur, although this is not the norm and often a result of the performance-based nature of the City Plan leading to the occasional “*left field*” proposal that needs to be assessed differently to determine whether performance outcomes have been met.

It was suggested that where cross-sectoral collaboration does occur in relation to a proposed development, it tends to produce inefficiency and may not lead to fruitful outcomes. TCC’s current internal structural arrangement, separating Planning Services and Townsville Water, limits Townsville Water’s involvement in the assessment process. As the ‘operational arm’ of council, Townsville Water does not typically get involved in development assessment decision making. This structure also prevents developers from dealing directly with Townsville Water, with feedback and advice “*always third-hand*” via Development Assessment. The constant “*back and forth*” seeking clarification “*rather than having a collective conversation*” results in significant paperwork rather than exploration of options and “*actual decision making*”. This is a source of frustration for developers, particularly because they cannot “*confront*” decision makers to ascertain whether their position is “*truly being reflected or understood*”. As one interviewee noted, “*even if you don’t get exactly what you’re asking for*”, at least being able to directly deal with a decision maker “*you feel that you put your best case forward*”.

On the other hand, the narrower focus of Townsville Water as a water utility suggests it may be more appropriately placed to be consulted for advice relating to non-standard issues, rather than play an active role in the development assessment process. In contrast to Townsville Water, development assessment engineers seek to balance conflicting land use, social, environmental and infrastructure issues. Because Townsville Water’s standards are incorporated into the planning scheme, it is within the development assessment engineer’s abilities to process ‘standard’ matters without further reference to Townsville Water. The utility’s distance from the development assessment process also prevents developers from ‘shopping’ for the best deal between Townsville Water or the development assessment engineer. It was suggested that current engagement mechanisms, such as fortnightly Development Assessment meetings to review proposed developments, provide the most appropriate avenue for Townsville Water’s input into the development assessment process, although broad support exists for strengthening the utility’s role in development assessment matters.

Within the past few years, TCC has taken steps to bridge departmental silos through an organisational restructure in 2017-18, which sought to promote more integrated functions, and the very recent establishment of a cross-council working group to advance the long-term vision of a Water Sensitive Townsville. The working group, authorised by a Director from the Executive team, is made up of committed general managers and senior officers from across water, planning, community engagement, assets and maintenance, and environmental services. Members voluntarily meet each month to progress council-wide actions that align with the Water Sensitive Townsville agenda. As a legitimate collaborative mechanism focused on doing, the working group has the potential to become the main vehicle for advancing the strategies identified in the *Vision and Transition Strategy for a Water Sensitive Townsville*, and the opportunities discussed in this report.

The presence of functional silos is a particularly common issue within local government (Smith, 2014). According to Keen et al. (2006), ‘communities of practice’ offer a useful approach for breaking down silos within local

government and supporting shifts in organisational culture. Communities of practice refer to ‘groups of people informally bound together by shared expertise and passion for a joint enterprise’ (Wenger & Snyder 2000, p. 139). Unlike a formal working group, communities of practice are self-organising, sustained by the common interest and momentum of their members. Keen et al. (2006) describe the successful use of a community of practice in Sutherland Shire Council, Sydney, where a group of engineers and planners came together to investigate ways to improve the council’s sustainability performance. They sought to develop a sustainability assessment process that was integrated across council, based on state requirements and council objectives. The success of the community of practice was attributed to a number of factors:

- **Committed mix of volunteers:** The group was made up of committed individuals with diverse backgrounds who volunteered their time.
- **Integrated focus:** It was objectives-led rather than focused on addressing discipline-specific issues. The objectives were directly aligned with corporate goals, derived from previous community visioning work.
- **Self-organising:** Initially set up with the support of external facilitators, once a framework was established, the group transitioned to self-management. While the voluntary, self-driven nature of the group meant that progress was slow, the quality of outputs was not affected.
- **Senior level endorsement:** The relevance of the group’s work was enhanced through the presence of senior and respected officers from different parts of the organisation. They helped steer activity through assessment questions tailored to the work of each unit, and linked to whole-of-council agendas.

The community of practice was, like any group, constrained by the political and social context within which council operates. Keen et al. (2006) highlighted the difficulty of aligning new ideas within existing organisational decision making processes and structures. As with any change, advancing the uptake of new ideas within an organisation starts with leadership. Sutherland Shire Council has a track record of high-level performance and commitment to ongoing improvement, and was considered a leader in local environmental management.

Opportunity #13. Trial collaborative mechanisms to bridge silos and support integrated urban and water planning.

VTs Strategy 6.4	Explore and pilot collaborative and integrated governance approaches that will deliver the broad city vision, beyond issue-specific solutions.
City Plan review	Embed integrated and collaborative processes in corridor plans for greenfield development.

The Sutherland Shire Council example highlights the possibility of bridging silos through communities of practice to coordinate activity and support organisational learning. As an informal group of volunteers united by a common purpose, communities of practice operate with flexible structures, progressing ideas and processes at their own pace. A number of water sensitive city champions exist within TCC. Connecting and organising these champions could be a useful starting point for integration. Individual champions from across different areas of council could be brought together, through a community of practice, to advance water sensitive solutions in urban planning. This group needs to:

- **be strategic in its focus**, with objectives related to system-wide change, actively disseminating learnings and knowledge throughout the organisation
- **maximise synergies**, by first understanding the relationships and structures that affect decision making within TCC, and promoting mechanisms that integrate aligned policy goals and values
- **be legitimised**, with leadership committed to listening and acting on recommendations.

The scope and purpose of the community of practice could evolve over several developmental stages, guided by the different types of collaborative networks identified by Agranoff (2006). Initially, an ‘*informational network*’ could be established to facilitate information exchange and exploratory discussions. Interactions could be regular lunchtime seminars, for example, where staff from different parts of council share their work to advance a Water Sensitive Townsville agenda. External speakers, such as officers from other local governments, could be invited to talk about current initiatives that provide relevant lessons for Townsville. Staff training and education programs to enhance organisational capacities would mark the next evolution of the champion network, from an

informational network into a '*developmental network*'. Once a regular or core group of committed members is established, the network could transform into an '*action network*' and become a true community of practice by formally adopting and delivering strategic actions.

TCC is uniquely placed to develop strong connections across council, because it is responsible for both land use planning and water servicing. TCC staff demonstrated a willingness to strengthen existing project-based mechanisms (by upskilling staff and adopting a more structured, coordinative approach to inter-departmental projects), as well as explore alternative mechanisms to improve integration and collaboration, both horizontally and vertically. For example, a total water cycle approach requires different practitioners who handle drainage, wastewater, potable water supply, waterways and open space to "*be seated in the same area and talk to each other*". Similarly, bridging water and land use planning to enable water sensitive greenfield development may require integrated planning groups at the officer and leadership levels, with regular interactions between the two groups. The officer level group would give effect to directions from the leadership group, as well as provide feedback and proactively engage the leadership group on appropriate actions and decision making. Each agreed 'solution' must be supported by compelling evidence to ensure they can be defended when conflicting objectives or activities arise.

4.3.3 Organisational culture

Townsville's transition to a water sensitive city is, like many Australian cities, affected by institutional factors that constrain local governments' ability to innovate. As a highly regulated sector tasked with advancing a range of public interests, local governments often lack the time and resources to engage in innovation. Across Australia, the activities of local governments are constantly diversifying and expanding as federal and state governments continue to relinquish an increasing number of responsibilities. The broad range of local activities places significant pressures on resource allocation, resulting in competition for funding. Accordingly, local governments have become increasingly reluctant to take on additional responsibilities that are not tied to adequate funding, particularly as they have limited capacity to increase revenue streams (Baker et al., 2012).

The ability to innovate within this increasingly resource-constrained environment is further complicated by a traditionally risk averse approach to planning and water management within the public sector. Interviewees discussed the inertia generated by cultural norms, with many identifying a 'fear culture' embedded within public agencies. Trying something new requires commitment and persistence, and often "*somebody convincing you to step away from pure engineering rules to something that is more based upon the objectives in the planning scheme*". However, interviewees noted council officers can be "*a bit terrified of stepping away from a standard*", and consequently encouraged to "*just do [things] a standard way*" because anything "*different*" is "*harder*".

The efficiency agenda across Australian governments has led to a focus on streamlining process and outsourcing of many functions, including expert advice. Consequently, many local governments lack the skills, knowledge or capacity to advance outcomes, such as WSUD or IWM. This was a concern highlighted by interviewees, particularly relating to planners' ability to exercise discretion, as projects that meet a policy goal but do not conform to a standard are often rejected or required to become compliant, reducing the scope for innovation. This appears to reflect an organisational culture that does not encourage risk taking and provides limited support for staff to broaden their skillset or knowledge beyond planning process. Planners are often not well equipped or empowered to decipher technical information that accompanies development applications (such as stormwater management, transport modelling and ecological mapping) to make informed decisions on appropriate land uses. In addition, time constraints imposed by key performance indicators and legislative controls require development applications to be processed within narrow timeframes, pressuring planners to resort to 'tick a box' efficiency and approving known options, rather than working to advance sustainable outcomes. These issues are compounded by a high turnover of staff in particular departments and difficulties with knowledge transfer from a small number of key staff with long experiences and deep knowledge. This has made it challenging to maintain a consistent, high-quality approach to policy implementation and led to reliance on a few key individuals to champion water sensitive outcomes.

The risk perceptions expressed by interviewees is not unique to Townsville or Queensland. Past research indicates traditional risk management paradigms have driven the development of the Australian water industry, leading to a highly conservative, techno-rational professional operating culture (Dobbie & Brown 2014; Farrelly &

Brown, 2011). Changing this culture to create a more enabling environment for the transition to a water sensitive city is a difficult process, requiring a dedicated institutional capacity building program. According to Brown (2008), effectively mobilising institutional change requires interventions across three interdependent areas of capacity building: human resource development, intra- and inter-organisational strengthening, and institutional reform (see Table 5). Yet most capacity building efforts often focus on a single area, such as human resource development, without targeting other areas. Accordingly, creating widespread change by operationalising water sensitive practices requires consideration of organisational and institutional environments via targeted interventions, in addition to training and education initiatives.

Table 5. Dimensions of institutional capacity building, with example interventions relevant to Townsville (adapted from Tables 1 and 3 in Brown, 2008.)

Dimension	Example interventions
Human resource development: Equipping individuals with the knowledge and skills to perform effectively	<i>Staff training programs</i> , e.g. skill development sessions focused on facilitating change management <i>Recruitment</i> , e.g. recruiting individuals with particular traits that promote a culture of innovation, such as risk taking, inquisitiveness and diversity
Intra- and Inter-organisational strengthening: Improving organisational cultures, management structures and procedures, strengthening inter-organisational relationships, and information sharing	<i>Leadership directions</i> , e.g. corporate policy for a water sensitive city, dedicated resourcing for WSUD <i>Communities of practice</i> , e.g. intra-organisational community of practice, like the WSC Working Group, inter-organisational policy communities
Institutional reform: Changing rules and incentives to improve organisational capacities	<i>Incentive systems</i> , e.g. incentives or disincentives that enable intra- and inter-organisational interaction <i>Measurement systems</i> , e.g. establishing benchmarking and reporting systems for organisational capacity

The discussion in preceding subsections identified opportunities that align with each of the capacity dimensions described in Table 5. Implementing a program of institutional change within Townsville should begin with political and administrative leadership levels promoting an organisational culture that embraces innovation and values water. Strong organisational cultures translate into focused organisational activity by providing shared values and norms that ensure all members of an organisation are working towards the same vision. An organisational culture that fosters innovation is determined by the following factors (Martins & Terblanche, 2003):

- Corporate strategy that explicitly supports creative and innovative practices
- Management systems and structures that enable flexibility, autonomy and cooperative teamwork
- Support mechanisms, such as creative and innovative personnel, rewards and recognition to promote particular behaviours, and integrative tools and resources
- Organisational values and norms that tolerate mistakes, and support continuous learning, risk taking and experimenting
- Open and transparent communication, as a means of building trust and integration across the organisation.

Efforts to improve organisational culture within TCC should focus on the factors above, as part of a broader program of change interventions which target all three capacity building dimensions.

Opportunity #14. Implement a program of organisational cultural change, guided by TCC leadership and tied to broader activity focused on institutional capacity building.

VTs Strategy 5.1	Enable and encourage innovation uptake through organisational culture, systems and processes.
Corporate Planning reform	Explicitly support creativity, innovation and experimentation in TCC's strategic directions.

5 Implementation pathways

The *Vision and Transition Strategy for a Water Sensitive Townsville* (Hammer et al., 2018) identified five key factors for creating an enabling environment for Townsville's transition towards a water sensitive city: champions, platforms for connecting, science and knowledge, projects and applications, and practical and administrative tools. The overall transition progress assessment indicated Townsville has made significant advancements towards its water sensitive vision, but is at risk of stagnation if critical enabling conditions are not established (Hammer et al., 2018).

This report has identified 14 opportunities to strengthen Townsville's performance across all five enabling factors, with a particular focus on practical and administrative tools, and platforms for connecting. These opportunities can be organised into three interrelated pathways for implementation (listed below). The first pathway is concerned with strategic leadership, highlighting the need to elevate water within strategic directions and policies at the state and local levels. The second pathway focuses on local planning instruments, exploring options to strengthen water provisions and streamline planning processes, while the third pathway seeks to harness TCC's potential as an integrated entity through improved cross-council linkages and cultural change. While there is a strong government focus within each pathway, realising identified opportunities will require extensive and ongoing engagement with the development industry and local communities.

1. **Strategic leadership – Prioritising water:** Clear state water directives are established and defined for implementation at the local level. A Water Sensitive Townsville agenda is embedded through a water-centric city vision, long-term policy priorities, water pricing strategy and TCC leadership in dry tropics WSUD.
2. **Planning – Streamlining decision making:** Water provisions in the City Plan are expanded and elevated through the inclusion of IWM outcomes, locally specific design policy, and water quality offsets schemes. Corridor planning is undertaken for growth areas to streamline decision making and infrastructure delivery. The planning scheme adopts prescriptive IWM provisions to enable consistent, cost-effective and innovative outcomes. PSP amendment processes facilitate timely revisions to design and construction standards.
3. **Operations – Optimising functions:** TCC functions as a truly integrated entity through coordinated activity that bridges traditional silos and fosters collaboration, supported by committed leadership.

The recently established cross-council WSC working group provides a critical platform for exploring and advancing the opportunities identified in this document. The breadth and seniority of members suggests the working group is uniquely placed to promote a whole-of-council Water Sensitive Townsville agenda through strategic engagement with internal and external stakeholders relating to the three implementation pathways. Table 6 presents a non-exhaustive list of actions related to each pathway for consideration by the working group. The suggested actions were derived from workshop discussions with practitioners on 26 February 2020. Actions can be delivered by smaller sub-groups focused on individual pathways.

Table 6. Implementation pathways and associated actions

Pathway	Actions
Strategic leadership – <i>Prioritising water</i>	<ol style="list-style-type: none"> 1. Socialise the Water Sensitive Townsville vision across TCC to promote broader awareness and alignment with council activities. 2. Develop an ongoing community engagement program to regularly 'calibrate' the vision in line with community values. 3. Undertake a gap analysis to investigate (mis)alignment between the vision and TCC's strategic documents, planning instruments and budget allocations. 4. Explore opportunities to connect related agendas, e.g. <i>Vision and Transition Strategy for a Water Sensitive Townsville</i>, and <i>TCC's Liveability Strategy 2020–2024</i>. 5. Develop measurable targets to track and report progress towards the Water Sensitive Townsville vision. 6. Identify and communicate lessons from past WSUD implementation successes and failures. 7. Explore specific project opportunities suitable for research collaborations with local universities.
Planning – <i>Streamlining decision making</i>	<ol style="list-style-type: none"> 8. Develop education programs on foundational principles of WSUD for internal and external stakeholders. 9. Work with the development industry to identify 'acceptable design solutions' and consider whether they should be prescribed within the City Plan. 10. Explore opportunities to collaborate with developers to pilot a small-scale water quality offsets scheme. 11. Explore opportunities to collaborate with developers and state/federal government (e.g. Queensland Department of Housing and Public Works, Defence Housing) to demonstrate contextual design principles on public and private land.
Operations – <i>Optimising functions</i>	<ol style="list-style-type: none"> 12. Review TCC functions, with a focus on improving collaboration between Townsville Water and other parts of Council. 13. Identify gaps in communication and explore mechanisms to improve information exchange across TCC.

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