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CITY WATER RESILIENCE ASSESSMENT

CAPE TOWN

# WATER RESILIENCE PROFILE

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# FOREWORD

The global urban population is estimated to nearly double by 2050. This has serious implications for urban water demand, which is likely to increase from the current 15-20 percent of global consumption to 30 percent of the world's entire water demand. Such a rise in water use will also lead to an increase in wastewater generation and, consequently, water pollution. Climate change further exacerbates pre-existing water stresses and is already having a measurable effect on the urban water cycle, altering the amount, distribution, timing and quality of available water.

To address these challenges, we must mainstream resilience in the planning and implementation of water systems, within the context of the larger metropolitan landscape and the watersheds that supply cities with water. We need tools that enable cities to diagnose and design for resilience to anticipate water variability and uncertainty from climate and non-climatic stressors. The City Water Resilience Approach (CWRA) responds to this need. This novel approach allows cities to comprehensively assess and plan for urban water resilience across sectors and stakeholders, as well as across city boundaries. The CWRA was developed and tested, with a number of strategic partners, in cities across both the developed and developing world. The CWRA is fully aligned with the World Bank's strategic approach to water: sustaining water resources, delivering services and building resilience. The Bank stands ready, in collaboration with our partners, to scale up CWRA globally.

**JENNIFER J. SARA**
Global Director, Water Global Practice
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THE WORLD BANK

The safety and well-being of millions, if not billions of people globally depends on the provision of safe, inclusive and resilient infrastructure systems. In the face of increasing urbanisation, population growth and uncertainty around climate and other natural and man-made hazards, those working across urban water systems need to recognise the three inherent parts of their complex systems: the technical (the physical and cyber components), the ecological (both naturally occurring and designed-in nature-based components) and the social (those who depend upon the system, as well as those who own, operate and maintain them). Furthermore, in cities, the interdependencies between different systems, different organisations, and public and private sectors are inescapable.

Within and between critical infrastructure sectors, there is a need to equip organisations and individuals across the entire value chain, with the tools and approaches they need to introduce resilience into their decision-making. People need to know what to do differently, and the City Water Resilience Approach fills that gap, taking city water stakeholders through the key stages from system mapping, resilience assessment to option identification and prioritisation, whilst recognising all of the complexities referred to above. The rigour and collaboration that sit behind it significantly enhance its value in practice.

The Resilience Shift believes that this approach has the potential to create genuine and lasting impact in cities globally, and is delighted to have supported this work.

**JULIET MIAN**
Technical Director
The Resilience Shift

THE RESILIENCE SHIFT

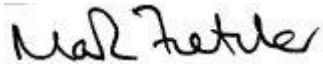
Global water crises – flooding, drought and poor water quality – are the biggest threat facing the planet over the next decade. As the world's population grows larger and more urbanised, resilient urban water management is critical to ensuring safe, healthy and prosperous cities.

The City Water Resilience Approach (CWRA) responds to a demand for innovative approaches and tools that help stakeholders and communities involved in the water cycle collaboratively build water resilience at an urban scale. It was developed to help cities provide safer and more secure water resources for their citizens and protect communities and property from water-related shocks and stresses. It provides a globally applicable, transparent, objective and evidence-based approach to develop a shared understanding of water resilience of a city and collaboratively develop and implement a resilient action plan.

The CWRA is a joint effort developed in collaboration with our project partners, the Stockholm International Water Institute (SIWI) and 100 Resilient Cities, along with city partners in Amman, Cape Town, Greater Miami and the Beaches, Mexico City, Kingston upon Hull, Greater Manchester, Rotterdam and Thessaloniki, with contributions from the Organisation for Economic Co-operation and Development (OECD).

On behalf of the study team, I would like to thank The Rockefeller Foundation and The Resilience Shift for supporting this project.

This project would not have been possible without the valued guidance and support of the CWRA Steering Group. Our thanks to the following: Fred Boltz (Resolute Development Solutions), Casey Brown & Sarah Freeman (University of Massachusetts, Amherst), Katrin Bruebach & Andrew Salkin (100 Resilient Cities), Jo da Silva (Arup), Nancy Kete & Juliet Mian (The Resilience Shift) and Diego Rodriguez & Maria Angelica Sotomayor (World Bank).



**MARK FLETCHER**
Arup Global Water Leader
*October 2019*

ARUP

# LETTER FROM CAPE TOWN

Cape Town is emerging from the worst drought in its recorded history. We have learnt many lessons from navigating this shock event which have been included in the new Water Strategy and the new Resilience Strategy. We need to be better prepared for future shock events that can disrupt the water system in our region.

Using a resilience lens to analyse our water system and build programmatic responses is a useful way to deal with uncertainty. Climate change, rapid urbanisation and technological change all pose challenges to our water future. We are therefore privileged that Cape Town was the first city in the world to have been selected to deploy the City Water Resilience Framework (CWRF). In June 2019 more than 40 water leaders from civil society, business, academia and government gave generously of their time to share their expert opinions on a range of factors that contribute to water resilience in Cape Town. We now have a water resilience profile for our city for the first time.

Due to this being the first time the CWRF has ever been deployed in the world, we have also been able to contribute to the community of practice on how to improve the framework and approach for water resilience. We are part of a global community of cities grappling with water-related shocks and stresses. We are hence grateful to have been able to work with other cities in helping to develop the CWRF. These cities include Mexico City, Amman, Hull, Miami, Rotterdam, Greater Manchester and Thessaloniki.

Resilience forms part of the vision for water in the new Cape Town Water Strategy. Cape Town is striving to be a water sensitive city by 2040 that optimises and integrates the management of water resources to improve resilience, enhance competitiveness and liveability for the prosperity of its people. We are excited to review the results of the CWRF as they apply to Cape Town, and to convert some of the insights gained into tangible new actions for the implementation plan of the strategy.

Thank you to all the water stakeholders from a range of organisations who generously gave up their time to contribute to this assessment. We also express our appreciation to Arup, the lead developers of the CWRF, and the supporting partners of this project, including 100 Resilient Cities, the Resilience Shift and the Stockholm International Water Institute for making this opportunity possible for Cape Town.

Sincerely,

**MIKE WEBSTER**
Director of Water and Sanitation,
City of Cape Town

**GARETH MORGAN**
Director of Resilience,
City of Cape Town

**XANTHEA LIMBERG**
Mayoral Committee Member for Water and Waste,
City of Cape Town

# EXECUTIVE SUMMARY

A unique opportunity exists to introduce resilience as an integral component of Cape Town's approach to water resource management.

Adopting a resilience approach helps stakeholders look at whole systems and how they impact on each other, particularly when parts of the system are struck by shock events. Viewing water in the context of the economy, urban development, ecosystem health, and the empowerment of stakeholders allows water leaders to examine water through multiple lenses at the same time, and to better understand the intersections between systems.

The Cape Town Water Resilience Profile provides a comprehensive assessment of water management in the city. It evaluates the wide-ranging factors that impact water management and service provision, and assesses the impacts of water on all Capetonians. In this, the Profile builds on other recent work initiated by the City. It explores key themes first presented in the Cape Town Water Strategy of 2019, which captures many lessons from the drought, and makes a firm commitment to a 'whole-of-society' approach to make Cape Town a truly water-sensitive city by 2040.

This document describes the assessment process and its results, identifying strengths that can be leveraged and built on, as well as those areas that can be improved upon to ensure water security in the city going forward. Based on these conclusions, it identifies initial opportunities for translating initial analysis into new interventions that build water resilience. Ultimately, insights from the assessment will translate into tangible new actions that build Cape Town's water resilience.

## WATER RESILIENCE

Water resilience describes the capacity of cities to function in the face of water-related stresses so that those living and working within the city can survive and thrive. A water resilient city is one that provides access to high-quality water services for all residents –including water supply, wastewater and sanitation services—and protects residents from water-related hazards. Assessing the strengths and weaknesses in a city's system is a critical first step in identifying and prioritizing future action.

The City Water Resilience Framework (CWRF) provides a model for urban water resilience based on consultation with over 700 individual stakeholders and fieldwork with eight cities around the world. The approach recognizes that shocks and stresses on the water system can have cascading impacts on a range of other city systems. A systems-based approach is needed that considers water within the wider context of urban resilience, and that engages with the diverse stakeholders involved in a city's water basin.

Arup and 100 Resilient Cities worked with the City of Cape Town to bring together regional stakeholders to diagnose the strengths and weaknesses of the water system using quantitative and qualitative indicators. These efforts were supported by workshops with community stakeholders to assess urban water resilience in the metropolitan area and identify actions that will promote resilience-building activities in Cape Town.

## RESILIENCE ASSESSMENT

Water Resilience Assessment Workshops engaged subject matter experts from government, academia, civil society and the private sector in round-table discussions focusing on the city's resilience to various water challenges. Stakeholder responses—combined with results from a smaller number of quantitative indicators—are summarized and grouped according to four dimensions of resilience: Leadership and strategy, planning and finance, ecosystems and infrastructure, health and wellbeing.

### Leadership and Strategy

- Since the Water Crisis, Cape Town leadership has promoted strategies that incorporate resilience into city-wide planning. An increasingly collaborative approach to integrated water resource management has been promoted, with a recognition that multiple stakeholders must work together towards this goal.
- To ensure sustainable management of water resources and water/sanitation services, improved collaboration between the municipal, regional and national spheres of government will be critical. Relationships between government, the private sector and civil society have improved since the height of the drought crisis at the beginning of 2018 but efforts to sustain and improve coordination must be maintained post-crisis.
- A key first step will be better coordination around collecting, managing and sharing data, including between government agencies, and between the scientific community and government.
- Still more needs to be done to improve engagement with local communities, identify local partners and ensure that opportunities exist for residents to provide meaningful input into decision-making around water issues. Initiatives that improve community engagement can help inform decision-making that accounts for the holistic social, environmental and economic costs and benefits of water programmes and projects.
- Moving forward, the City will need to extend its focus beyond water supply and commit additional resources to address specific needs related to wastewater, drainage and sanitation.

### Planning and Finance

- Cape Town generally provides equitable water and sanitation services to all residents. The use of block tariffs and high metering ratio means that people pay according to their level of consumption, which promotes water efficiency. Affordability is considered in tariff setting, and poor households receive subsidies. However, clear and transparent guidelines are needed around how tariffs are designed and calculated.
- Strong legal frameworks are in place to support regulation and decision-making around water resources, including public health regulations around drinking water. Whilst procurement processes are sometimes slow, on the whole they are viewed as both transparent and fair.
- Sustainable funding sources are needed to develop new infrastructure for water supply, sanitation and stormwater infrastructure, and to maintain existing infrastructure.
- Opportunities exist for improved coordinated planning between City agencies and other government departments, including with sectors such as energy, agriculture, solid waste management, transportation and housing, which are both influenced by water supply decisions, and influence how water resources are managed. In particular, coordination with City agencies responsible for land use planning will be critical to ensuring sustainable water services for Capetonians.

**Infrastructure and Ecosystem**

- The City achieved remarkable efficiencies in promoting sustainable household water use during the crisis, though government and NGOs will need to continue to promote sustainable use through widespread communication efforts and incentives for water users. In spite of high water metering rates, water consumption is rising in the city, and the long-term sustainability of the city's water supply remains a chief concern.
- Risk readiness should be incorporated into all aspects of government operations and disaster risk management could be better integrated into proactive decision-making before disaster events occur. Additional efforts can be made to ensure that government works closely with neighbourhood groups and communities to improve their local capacity to mitigate and respond to shocks.
- Water infrastructure is robust and well-managed, although improvements are needed for wastewater and drainage assets and to ensure water and sanitation infrastructure is present in informal settlements.
- The water system is generally well monitored—especially around quality of drinking water, and bulk water and reticulation networks—but significant gaps exist in the City's knowledge of aquatic ecosystems, drainage and groundwater resources. More data—and better dissemination of existing data—is needed around environmental and ecosystem monitoring, including the health of rivers, groundwater and environmental services.
- The holistic benefits of green infrastructure should be better integrated into decision-making, including for flood protection planning, and green infrastructure should be synergized with grey infrastructure.

**Health and Wellbeing**

- Cape Town provides essential water and sanitation services to residents, industry and commercial users at a high level of service quality and coverage. Quality and quantity of water service is generally good throughout the city, though additional efforts are needed to improve accessibility and minimum service levels in informal settlements.
- The expansion of informal settlements presents an ongoing challenge, and the quality of universal basic services—notably sanitation services—varies within the city; the operation and maintenance of sanitation infrastructure in informal areas is particularly concerning.
- There is a need for enforced land-use controls to decrease local communities' risk of exposure to climate-related risks and minimize the likelihood of displacement. The quality of other key services, such as healthcare to respond to water-related illness, vary by income level and location.
- Despite some excellent examples of water-sensitive development and innovative pilot projects, the City struggles to implement and maintain comprehensive blue-green infrastructure. Similarly, though Cape Town benefits from large areas of natural green space, these amenities may not be accessible to large proportions of the city population.
- More investment is needed to strengthen building-level water efficiency, introduce urban water amenities and promote water sensitive design, including by retrofitting existing buildings.
- For both new and existing buildings, better enforcement of existing laws on a continuous basis is required to ensure efficient water use and sustainable drainage.

## OPPORTUNITY AREAS

Based on results from the assessment workshops, participants prioritised ten critical challenges confronting Cape Town, and identified twelve opportunities that respond directly to these challenges.

| THE CHALLENGE | THE OPPORTUNITY |
| --- | --- |
| **Water sensitive design: much spoken about, little seen** | **Celebrating and reconnecting people, nature and water towards achieving a water sensitive city by design.**<br><br>Changes in population size and composition, climate, the economy and technology, which will influence water use and availability now and in future. An opportunity exists to promote water as a driver of City planning, with water-sensitive urban design and land-use planning actively promoted to minimise environmental degradation and improve aesthetic and recreational appeal. This opportunity aligns with the 2019 Cape Town Water Strategy, which stresses the importance of integrating natural features into the built environment to enhance the function, beauty, and resilience of the water infrastructure and landscape. |
| **Engagement and collaboration in the urban water system in a low-trust environment** | **Making Cape Town a high trust city through community engagement and pro-active partnering to build social cohesion and empowerment across the city.**<br><br>Many residents and businesses lack trust in the City's decision-making around water. New efforts are needed to improve relationships between government and community partners. Equitable, transparent and inclusive urban water management will help build trust and improve planning and implementation around water and sanitation service provision. |
| **Financing water resilience: where do we get the money from?** | **Identifying, implementing and protecting a diversified and sustainable funding system supporting a water resilient Cape Town.**<br><br>The City lacks sustainable funding streams to close the financing gap for infrastructure investments necessary to build resilience in the water system. An opportunity exists to identify, implement and protect a diversified and sustainable funding system to build water resilience in Cape Town. |
| **We are not in it alone!** | **Making Greater Cape Town globally recognised for its sustainable water management, which optimises the water resources for the economic, social and environmental benefit of all.**<br><br>Cape Town needs to improve water management to ensure that it can meet the current and future water demand of all citizens, businesses and industries. An opportunity exists to promote collaborative approaches that make Cape Town a global leader in water management by building strong relationships with residents and the business community, as well as with other government entities. Adaptive planning will help ensure that water resources are more efficiently allocated, reducing waste, encouraging re-use and increasing water recycling. |

# 1

# INTRODUCTION

# CONTEXT

***Cape Town's dominant water story for most of the last four years has been the extreme multi-year drought confronted by the city and its people. It is a remarkable achievement that a city of over 4 million people was able to reduce its collective consumption by approximately 50% in a short period of time, in order to avoid 'Day Zero'. Undoubtedly, there are many lessons to be learnt from Cape Town's experience of navigating this shock event.***

Many water leaders from across Cape Town will point to the importance that building partnerships between government, organisations and citizens played in safely avoiding 'Day Zero'. Other water leaders might mention the importance that information sharing played, particularly during the latter stages of the drought crisis, which contributed to building trust and which allowed stakeholders to have better appreciation of their own levels of risk.

Whatever the lessons learnt, and there are many, it is important to realise that these lessons are relevant for responses to a range of water-related shocks and stresses. So while drought is the dominant story at the moment, Cape Town cannot afford to take its eye off other shocks. Localised flooding, for example, affects a large number of Capetonians, particularly those people living in informal settlements. Due to climate change, Cape Town may have more frequent and intense flooding events in the future.
With regards to water related stresses, the provision of safe, acceptable and accessible sanitation in informal settlements is an ongoing challenge for Cape Town. This intersects with other stresses like high degrees of poverty and inequality.

The usefulness of taking a resilience approach to water is that stakeholders are able to look at whole systems and how they impact on each other, particularly when parts of the system are struck by a shock event. Looking at a water system alone is a common approach, but looking at water in the context of the economy, urban development, ecosystem health, and the empowerment of stakeholders, is a newer approach. The CWRF helps water leaders to examine water through multiple lenses at the same time, and to better understand the intersections between systems.

The Cape Town Water Strategy of 2019, captures many lessons from the drought. It makes a firm commitment to a 'whole-of-society' approach. It acknowledges that for Cape Town to achieve its vision of being a water sensitive city by 2040 that optimises and integrates the management of water resources to improve resilience, enhance competitiveness and liveability for the prosperity of its people, then all people and organisations in the city need to contribute to the achievement thereof.
As the Water Strategy states, "collaborative relationships are based on trust, and trust is built where there is transparency and mutual accountability, and where stated intentions of all partners are consistently translated into actions."

The CWRF assessment for Cape Town offers a rich diversity of dimensions which government, organisations and citizens can work together on to achieve the city's water vision. These include empowering citizens, creating healthy urban spaces, improving the protection of aquatic habitats and ecosystems, and better integrated planning across interdependent urban systems.

The challenge for Cape Town is to take the insights generated from the CWRF and turn them into actions.

*Clockwise from top: Sea Point, Cape Town (credit: Hilton1949), Theewaterskloof Dam (credit: Masixole Feni ), Steenbras Dam (credit: Michael Hammond), Newlands Spring collection point (Nathan Geffen / South Africa Today)*

Water resilience describes a capacity to survive and thrive in the face of water-related shocks and stresses. Resilience allows cities to anticipate, adapt and respond to disruptions, with the goal of protecting the health, well-being and prosperity of the people living and working in the city. A water resilient city is one that provides high quality water and sanitation services to its residents during normal conditions and in the face of shock events related to water—including sudden shocks such as floods, storms and human-caused disruptions, slow onset events like drought and sea level rise and persistent stresses such as poor water quality, water scarcity or inadequate infrastructure. In this context, resilience means that the city exhibits the capacity to:

- **Provide** access to high-quality water-related services for all residents, including water supply and sanitation services, and access to water amenities
- **Protect** residents from water-related hazards, such as droughts, flooding and contaminated water

To achieve these objectives, all relevant stakeholders involved in the water cycle should be considered, and the interrelationships between water and other critical urban systems must be well understood. A holistic and wide-lens perspective is, therefore, key to building resilience.

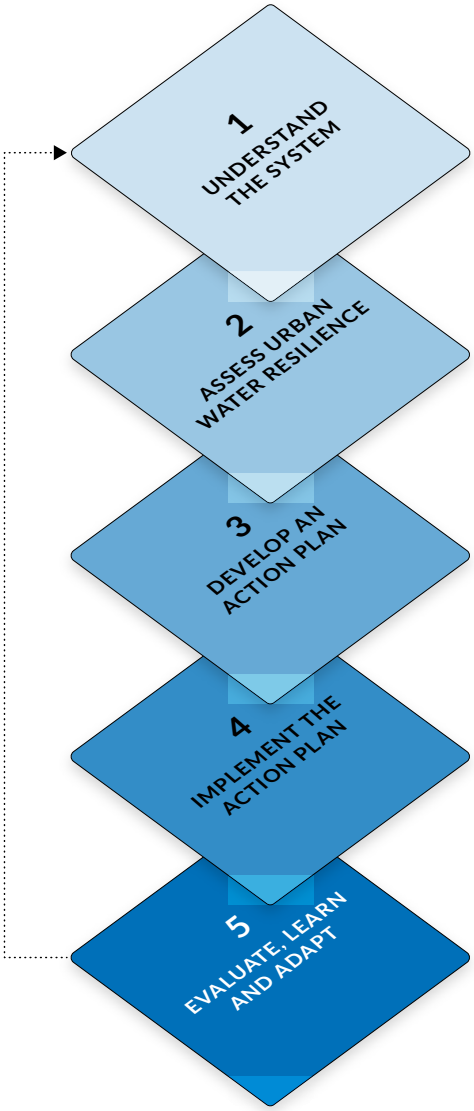
Evaluating urban water resilience means understanding the city's natural and hydrological setting, its built infrastructure and its unique human, social, political, and economic setting. It requires an understanding the full range of stakeholders involved in the water cycle, and the interrelationships between water and other critical urban systems; the water sector operates interdependently with energy, transport, waste management, public health, housing and a host of other city systems. A systems approach also helps account for the important ways governance influences decisions around assets, how socio-cultural systems determine human behaviour, and how these phenomena ultimately impact how physical systems are designed and used in the urban environment. A holistic approach and wide-lens perspective is therefore key to understanding and building water resilience.

*Berg River Dam (credit: Daniel Saaiman)*

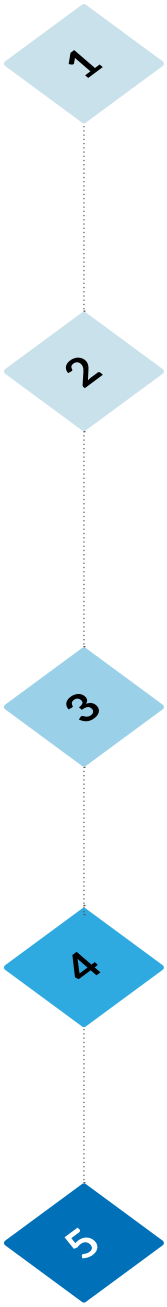
## THE CITY WATER RESILIENCE APPROACH

**The City Water Resilience Approach (CWRA)** responds to a demand for new approaches and tools that help cities grow their capacity to provide high quality water resources for all residents, and to protect them from water-related hazards ("provide and protect"). The CWRA process outlines a path for developing urban water resilience, and provides a suite of tools to help cities survive and thrive in the face of water-related shocks and stresses.

The CWRA is based on fieldwork and desk research, collaborative partnerships with subject matter experts, and direct engagement with city partners. The approach was developed through investigations in eight cities, and consultation with over 700 individual stakeholders, by Arup—working with the Stockholm International Water Institute (SIWI), 100 Resilient Cities (100RC), the Organization for Economic Co-Operation and Development (OECD) and in close collaboration with city partners from Cape Town, Amman, Mexico City, Greater Miami and the Beaches, Hull, Rotterdam, Thessaloniki, and Greater Manchester. Each partner city confronts persistent water-related shocks or suffer chronic water-related stresses and are committed to co-creating water resilience approaches. The cities represent diverse geographies, and face a range of shocks and stresses, in a variety of socio-political contexts.



The approach outlines five steps to guide partners through initial stakeholder engagement and baseline assessment, through action planning, implementation and monitoring of new initiatives that build water resilience:




**Understand the system** - the city's unique context is appraised to understand shocks and stresses, identify system interdependencies, convene local stakeholders and map key infrastructure and governance processes. This first step of the CWRA process results in City Characterisation Reports that summarize the results of this research.

**Assess urban water resilience** - the city's current practices are assessed using the City Water Resilience Framework to identify areas of existing strength and weaknesses and establish a baseline against which progress is measured. This second step results in a City Water Resilience Profile, which summarizes the assessment process and outlines potential actions to build resilience.

**Develop an action plan** - based on the city assessment, an action plan is developed for realizing interventions that develop water resilience. The action plan is based on holistic evaluation of anticipated benefits and costs and prioritization of projects identified in the previous step.

**Implement the action plan** - actions agreed upon during the previous step are implemented according to best practices. In this step, the CWRA provides best practice guidance for how ongoing actions can be monitored to ensure objectives are met, and resources are used appropriately.

**Evaluate, learn and adapt** – implementation is evaluated. Adjustments are made to the implementation plan to account for new developments or changing circumstances in the city, and to align with updated objectives for the next period.

To guide cities through this process, the CWRA offers a suite of resources that target specific challenges identified by cities in their efforts to build water resilience:

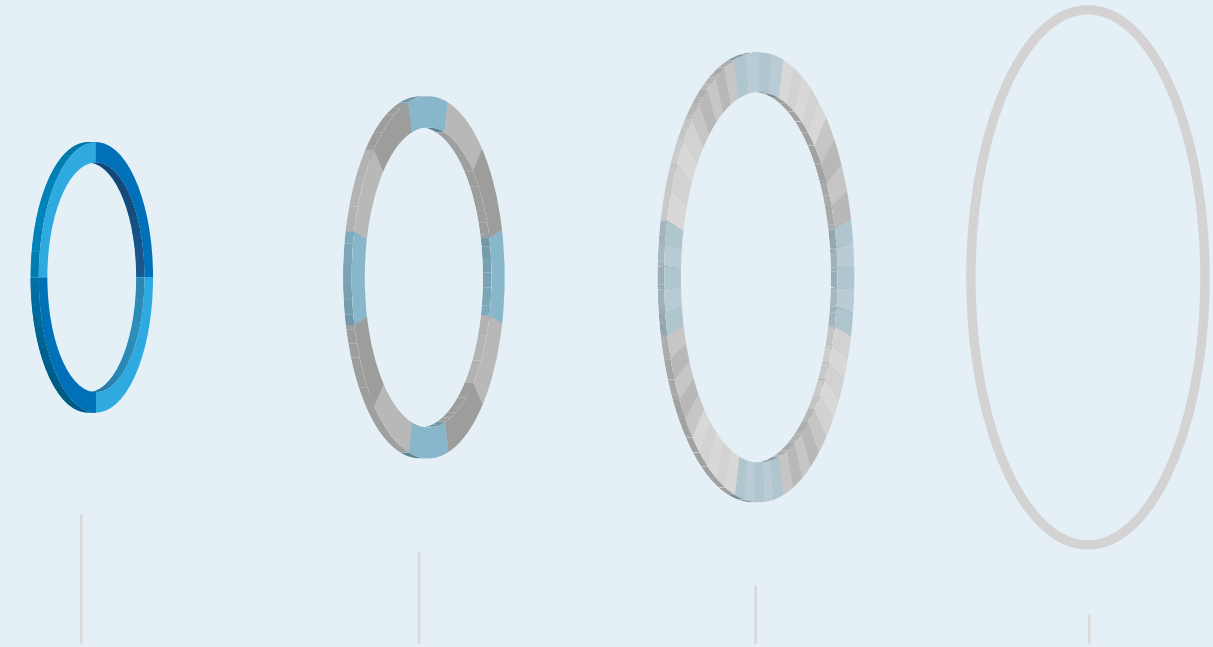
- OurWater is a digital tool that helps cities better understand the types of shocks and stresses they confront, their impact on natural and man-made infrastructural systems, and the interaction between key stakeholders involved in urban water management. The OurWater tool is used in Step 1 of the CWRA to map the infrastructure and governance arrangements that define the urban water system.
- The City Water Resilience Framework (CWRF) assesses the resilience of a city to water-based shocks and stresses and allows the city to identify and prioritize future action. Understanding their resilience helps cities formulate a clear vision of what urban water resilience means to them, including what specific conditions must be in place to achieve this vision, what efforts will be required to build resilience and what actors are involved. The CWRF is the primary tool used in Step 2 to assess urban water resilience, and the focal point for workshops conducted in the city.

The CWRF is the primary tool used in evaluating the strengths and weaknesses of an urban water system, and the city's overall resilience to water-related shocks and stresses. Workshops held in Cape Town assessed the metropolitan area against a model of water resilience—comprising dimensions, goals, sub-goals, and indicators—that are described in the CWRF.

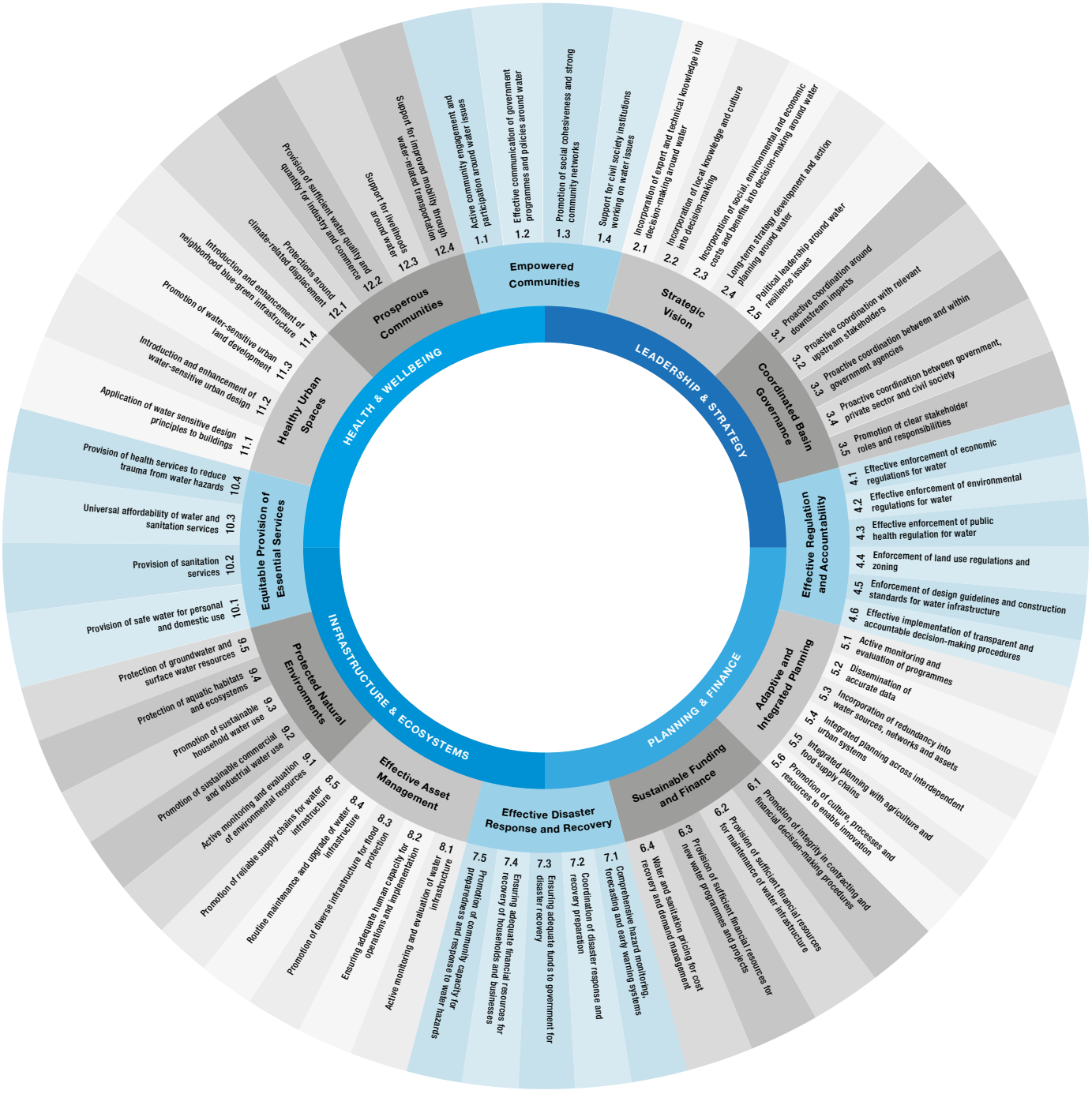
The innermost ring of the CWRF consists of four **dimensions**, critical areas for building resilience. Within each dimension are the resilience **goals** that cities should work towards to build resilience in that area. Hybrid goals, which are marked in a different colour, refer to goals that can be placed in more than one dimension.

Resilience **sub-goals** identify the critical elements for realizing each goal. They provide additional detail and help guide the concrete actions that help realize each goal. Finally, the outermost layer of the CWRF wheel consists of **indicators**, which measure how the city performs according to each area.

*The CWRF consists of dimensions, goals, sub-goals and indicators.*



*The City Water Resilience Framework 2019*



# WORKSHOP METHODOLOGY

*This section describes the approach taken to assess water resilience in Cape Town. Three workshops with city stakeholders assessed urban water resilience in the city and helped identify actions that will promote resilience-building activities.*

## WATER RESILIENCE ASSESSMENT WORKSHOP

The objective of the assessment workshops was to evaluate the resilience of Cape Town's water system using the City Water Resilience Framework (CWRF) tool. Results informed strategy development and action planning in the Visioning Workshop hosted later in the week.

### STAKEHOLDERS

The Water Resilience Assessment workshops gathered subject matter experts from government, academia, civil society and private sector to participate in round-table discussions focusing on the resilience of Cape Town to water challenges. A total of 39 participants attended workshops hosted in June 2019.

### WORKSHOPS

Two workshops were held, each one covering two different resilience 'Dimensions' from the CWRF, with a different selected group of stakeholders.

*Indicator Assessment Workshop 1 covered the two 'Dimensions of Resilience':*

- Planning and Finance
- Infrastructure and Ecosystems

*Indicator Assessment Workshop 2 covered the two 'Dimensions of Resilience':*

- Health and Wellbeing
- Leadership and Strategy

Stakeholders were organised according to their expertise relative to CWRF goals. Each group consisted of 4-6 participants and completed 1-2 CWRF goals, depending on how quickly the group answered each indicator question and the number of indicators they were assigned (on average 6-8 per workshop).

### SESSION OUTLINE

The Assessment Workshop consisted of two sessions:

1. *Introduction to the CWRF* - The session began in plenary with a welcome address by Gareth Morgan, the Director of Resilience for the City of Cape Town, followed by a short presentation of the CWRF and the day's agenda.
2. *Indicator Assessment* - During the second session, participants assessed each qualitative indicator.

- Attendees were split into four groups based on their area of expertise and to reflect a range of perspectives in each group.
- The facilitator introduced each new indicator by reading the name of the indicator out

loud, then allowing time for participants to read guiding criteria and take notes.

- The facilitator asked each participant to provide an initial score with minimal explanation for why they assigned that score.
- Once all participants had reported, the facilitator encouraged them to explain their scores.
- The facilitator then asked participants to provide a final score and, if the first and second score differed, to reflect on the reason for the updated score.
- A consensus score describing the level of agreement amongst participants was also recorded.
- Discussion of each indicator lasted a maximum of 20 minutes, though some groups concluded in less time.

After the last indicator session, facilitators asked participants to provide feedback on the workshop process and summarise strengths and weaknesses of the Cape Town water system based on discussions from the day.

Following the Assessment Workshops, facilitators convened to reflect on the workshop, and compile scores for preliminary analysis.

The results from both workshops identified strengths and vulnerabilities. Through analysis of these results, the project team then developed ten (10) statements that reflected the critical challenges identified by Cape Town stakeholders.

## MEASURING RESILIENCE

Indicators help measure complexity when direct measurement is difficult (or impossible). Responses to indicator questions help the city identify strengths and weaknesses, measure progress over time and can compare itself with other cities around the world.

The CWRF takes a pioneering approach to measuring resilience through collaborative workshops dedicated to discussing qualitative indicators, supplemented by a smaller set of quantitative indicators that provide additional detail and help validate qualitative results. This mixed approach has been adopted because elements of resilience—especially those related to water governance—can be difficult to measure quantitatively. For example, a quantitative indicator might suggest whether a long-term strategy exists, but not whether the strategy is a good one or if has been properly implemented.

The qualitative approach adopted in CWRF Resilience Assessment Workshops allows for a diversity of views on the same subject, gauges general perception of system performance and creates an opportunity for capacity building and dialogue between stakeholders. This approach also reveals how much consensus exists between different city stakeholders on any given topic. The assessment can be conducted over a single week (with additional quantitative indicators gathered later) reducing the time and cost associated with the assessment.

*Participants at the second Assessment Workshop, hosted by the Western Cape Economic Development Partnership*

## VISIONING WORKSHOP

During the Cape Town Visioning Workshop, participants from the previous two workshops reconvened to identify specific actions that can be incorporated into future strategies to improve resilience in the Cape Town.

The objective of the Visioning Workshop was to define and prioritize actions to improve the resilience of the city's water systems based on initial findings of the resilience assessment. During the Visioning Workshop, the project team presented preliminary results from the Resilience Assessment Workshops back to participants, highlighting key challenges facing the city. Responding to these challenges, participants identified areas of opportunity for building resilience in Cape Town, and then outlined specific actions that will help advance these visions.

### STAKEHOLDERS

Twenty seven stakeholders attended the Visioning Workshop. Having attended previous sessions, participants were familiar with the project objectives and use of the CWRF "wheel" to identify strengths and resilience vulnerabilities in Cape Town.

### SESSION OUTLINE

The Visioning Workshop consisted of three sessions:

1. ***Introduction*** – The project team presented conclusions from the Resilience Assessment Workshops, including an overview of strengths and resilience vulnerabilities identified using the CWRF. During introductory presentations, participants were reminded of the diverse shocks and stresses confronting Cape Town and were urged to consider the full range of these shocks and stresses when developing actions to build resilience.

2. ***Visioning*** – Following the introduction, participants were asked to identify critical challenges confronting Cape Town. These challenges were presented as Problem Statements developed by facilitators based on the two Assessment Workshops, through analysis of CWRF scores and comments provided by workshop participants. From ten Problem Statements, participants selected the four most critical. They worked in pairs to identify a Vision Statement that responded to each problem. The Vision Statement articulated how resilience might address specific challenges confronting the city.

3. ***Solutioning*** – Participants were asked to develop concrete actions based on the problems and visions identified in the previous step. The "solutioning" phase was broken down into two stages. In the first stage, participants developed a Design Brief that identified beneficiaries, needs, challenges, and assets and resources available to realise the resilience "vision." In the second stage, participants worked in groups of 1-3 people to identify a specific Proposed Action that could help advance the vision. In this, participants were asked to identify next steps in the short to long-term, key decision-makers, and the shocks and stresses the action might respond to. Participants presented Proposed Actions back to the full group in plenary and identified the actions they believed were most important for the city to pursue.

## FOCUS SESSION

The City of Cape Town (CoCT) Resilience Department hosted a short reflections session at the Cape Town Civic Centre. During the session, the project team presented results from the week to stakeholders, including the Director of Water and Sanitation.

### STAKEHOLDERS

Eight stakeholders attended the first part of the workshop, with a smaller group —all of whom attended two or more of the week sessions— remaining to provide feedback on the workshops.

### SESSION OUTLINE

During the session, the project team described the use of the CWRF in assessing resilience of the city's water system, then reviewed key lessons from the week using the completed CWRF "wheel" to identify areas of strength and weakness for Cape Town. The project team also introduced OurWater, a digital tool developed by the CWRA team to support water resilience.

Four people remained as part of a smaller group that provided feedback on each workshop.

# 2

# ASSESSMENT ANALYSIS

*Water Resilience Assessment Workshops engaged subject matter experts from government, academia, civil society and the private sector in round-table discussions on the city's resilience to water challenges.*

*The following section presents the results of the resilience assessment workshops, categorized into the four dimensions of resilience defined in the CWRF. For each dimension, the report provides an overview of the strengths and weaknesses identified, and scoring results for individual indicators. A summary of key themes identified during round-table discussions has been included in Appendix A: Qualitative Assessment Results.*

# INDICATOR SCORES

Indicators describe the ideal or best-case scenario, and the score provided for each indicator reflects how well the Cape Town currently performs when compared against that best-case. For example, workshop participants were asked to reflect on whether the statement "a long-term strategy is in place to guide projects and programs that build water resilience over time" accurately describes current practice in Cape Town.

To help guide discussions, a series of "guiding criteria" were provided to participants at each table. Guiding criteria have been based on desk research and expert inputs, and they identify important considerations for each indicator. They establish a common language and frame of reference for workshop participants, who often bring different perspectives, interests, and expertise to the conversation.

Where multiple indicators were required to assess a resilience sub-goal, each indicator was discussed by the group separately. All indicator questions are provided in the following section, organized according to sub-goal.

### INDICATOR SCORES

**5 - Optimal**

The indicator fully reflects conditions in the city. No improvement is required.

**4 - Good**



The indicator mostly reflects conditions in the city. Minimal improvement is required.

**3 - Fair**

The indicator somewhat reflects conditions in the city. Some improvement is required.

**2 - Low**



The indicator mostly does not reflect conditions in the city. Significant improvement is required.

**1 - Poor**

The indicator does not at all reflect current conditions in the city.

**N/A**

The indicator is not relevant to the city.

*For each indicator, a qualitative score and consensus score are provided*

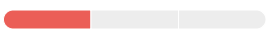
### CONSENSUS SCORE

Consensus score of indicators is shown in detailed results later in this section

**High consensus**

**Medium consensus**

**Low consensus**

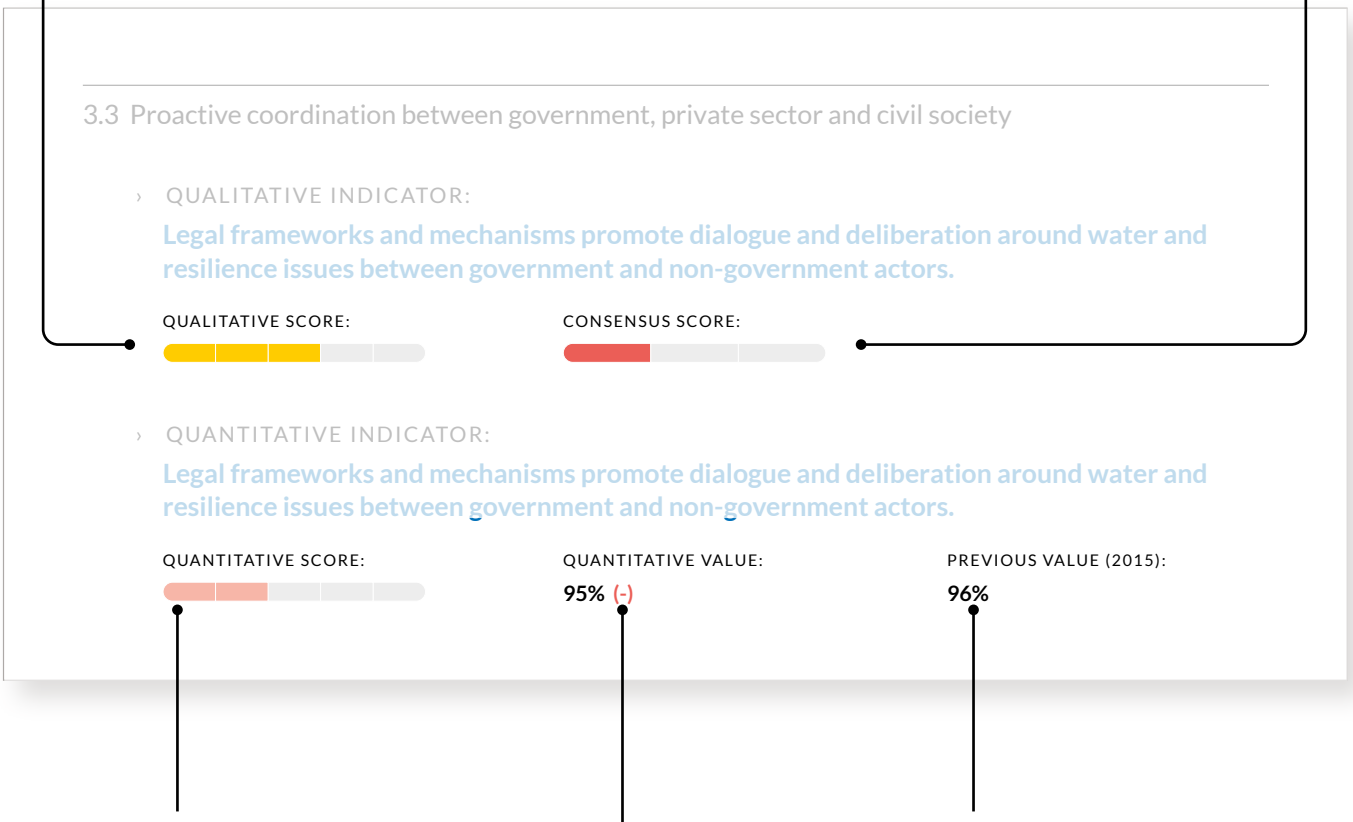


## Qualitative score

The score shown here reflects the median score for the table, taken from all participants at the end of each round-table discussion. They range from 1 (poor – "significant improvement is needed") to 5 (optimal – "no improvement is needed").

## Qualitative consensus score

This number indicates the level of agreement between stakeholders. The consensus score is expressed as High (3), Medium (2) and Low (1). This metric indicates the degree to which different stakeholders understand and assess challenges similarly. The consensus score is derived by measuring the standard deviation between the answers provided. A lower standard deviation—expressing a smaller difference between individual members of a group and the group's mean value—translates as high agreement (3) and a higher deviation suggesting low agreement (1).




## Quantitative indicator score

Quantitative indicators are provided where possible, though not all sub-goals can be measured quantitatively. For clarity, raw values are translated into 1-5 (poor-optimal) scores using standard thresholds. For more information, see Appendix.

## Previous value

A 'previous value' shows the quantitative value for an earlier year. This number indicates whether progress has been made from the last recorded period.

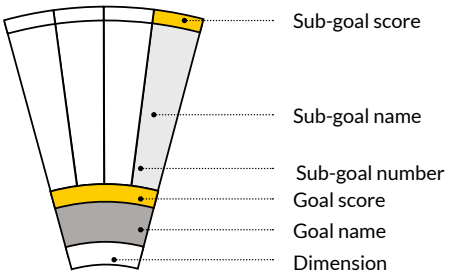
## Quantitative value

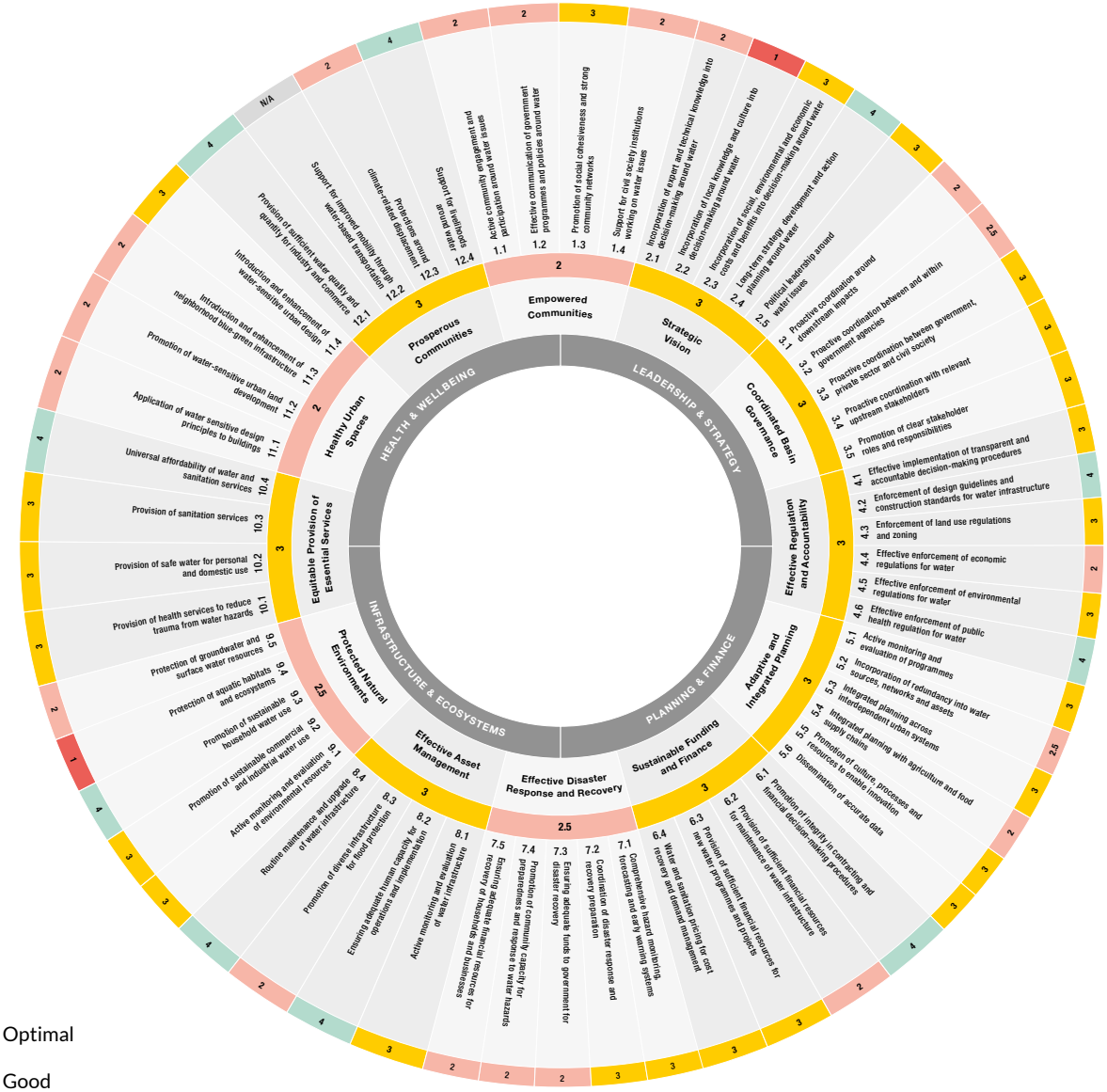
The 'value' is the raw figure provided before it is translated into a 1-5 score. A plus or minus mark indicates whether the value is higher or lower than previously recorded.

*An example of indicator scores for resilience sub-goal 3.3*

# INTERPRETING RESULTS

The wheel provides a snapshot of strengths and weaknesses for Cape Town in building its resilience to water-related shocks and stresses. It describes how the area performs against a best-case scenario for each of the 62 sub-goals.



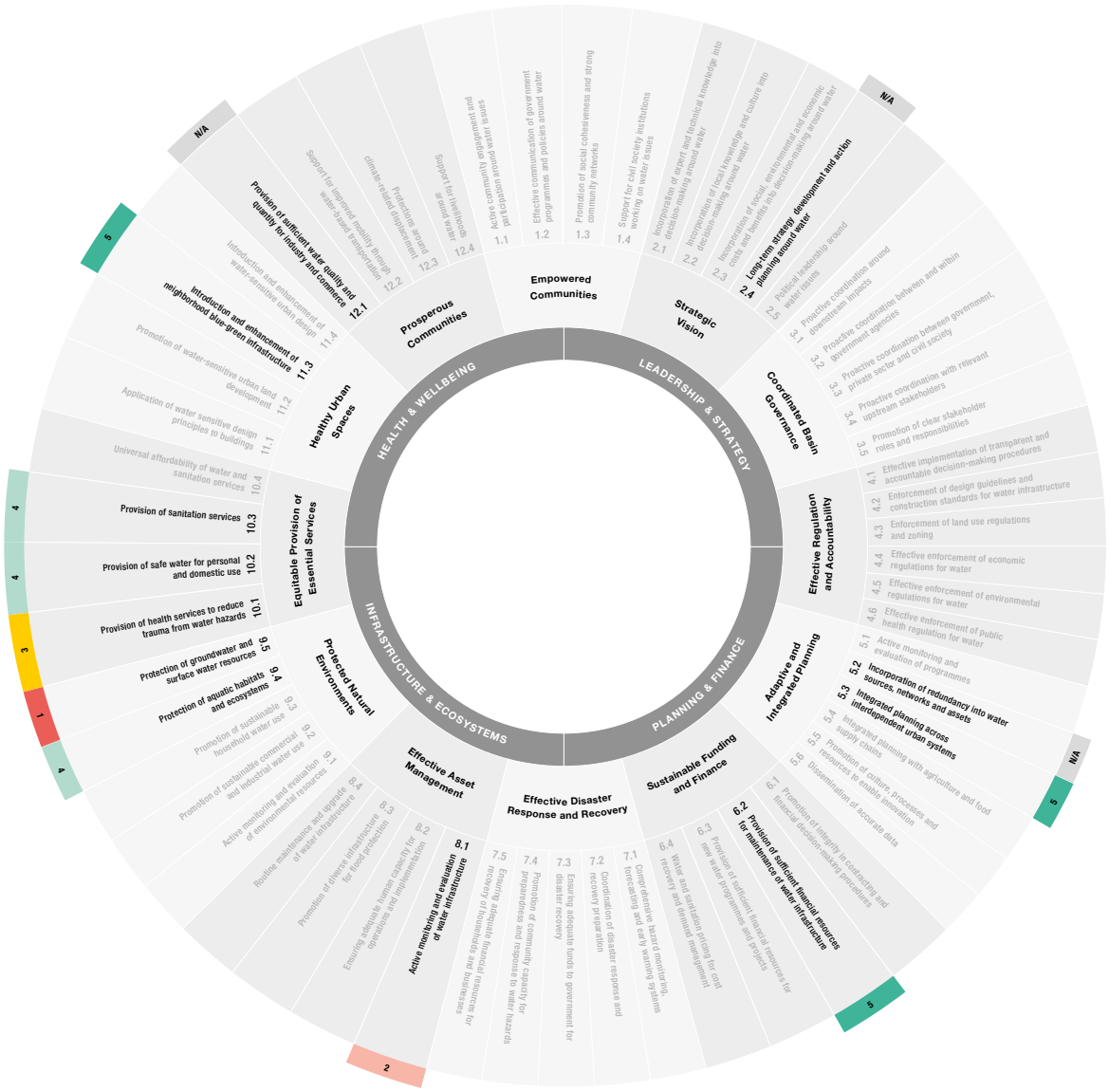




5 Optimal
4 Good
3 Fair
2 Low
1 Poor

Results from the Cape Town Water Resilience Assessment, **qualitative scoring**

Scores for all resilience **sub-goals** are provided along the outer edge of the CWRF wheel, while averaged scores for resilience **goals** are shown in the inner ring. Results for each resilience indicator are provided in the next section.

Qualitative scoring and discussions are based on the input from participants in each of the round-table discussions. A strong effort was made to develop groups with diverse and technical expertise and knowledge of the subject areas.




Results from the Cape Town Water Resilience Assessment, **quantitative scoring**

# LEADERSHIP & STRATEGY

Since the Water Crisis, Cape Town leadership has promoted strategies that incorporate resilience into city-wide planning. Documents such as the Cape Town Water Strategy and the Cape Town Resilience Strategy demonstrate political will to incorporate resilience as an element in policy-making. In the water sector, an increasingly collaborative approach to integrated resource management is promoted, with an acknowledgement that multiple stakeholders must work together to achieve optimal outcomes.

Still more needs to be done to improve engagement with local communities, identify local partners and ensure that opportunities exist for residents to provide meaningful input into decision-making around water issues. Greater collaboration is needed with residents, and a culture of listening and learning should be promoted in City agencies. At the same time, a more holistic approach to decision-making is needed to account for the social, environmental and economic costs and benefits of water programmes.

Serious challenges lie in coordinating between the agencies responsible for management of water resources, including the Department of Water and Sanitation (DWS). With approximately 95% of Cape Town's water coming from upland surface water sources that lie beyond the City's administrative boundaries, improved collaboration between the municipal, regional and national spheres of government is critical to ensuring a sustainable future. Relationships between government, the private sector and civil society have improved since the height of the drought crisis at the beginning of 2018 but efforts to sustain and improve coordination must be maintained post-crisis. Extending its focus beyond water supply, the City will need to commit additional resources to address specific needs related to wastewater, drainage and sanitation.

Better coordination is also needed between the scientific community and city government around collecting, managing and sharing data. Breaking down information silos within and between public, private and academic actors will allow all Cape Town stakeholders to take advantage of excellent technical knowledge and research, and to ensure that accurate data informs evidence-based decision-making.

Qualitative scoring

**Quantitative** score for
Leadership & Strategy


**Qualitative** score for
Leadership & Strategy

1 Poor 2 Low 3 Fair 4 Good 5 Optimal


# EMPOWERED COMMUNITIES

## 1.1 Active community engagement and participation around water issues

› QUALITATIVE INDICATOR:

**Legal and institutional frameworks and mechanisms promote active, free and meaningful participation around issues related to water supply, sanitation, drainage and flooding.**

QUALITATIVE SCORE (2/5):

CONSENSUS SCORE (2/3):

## 1.2 Effective communication of government programmes and policies around water

› QUALITATIVE INDICATOR:

**Mechanisms ensure that comprehensive information on government programmes and policies are disseminated to all stakeholders**

QUALITATIVE SCORE (2/5):

CONSENSUS SCORE (1/3):

## 1.3 Promotion of social cohesiveness and strong community networks

› QUALITATIVE INDICATOR:

**Mechanisms ensure that financial, institutional and technical support is provided to civil society institutions working on water issues.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (2/3):

## 1.4 Support for civil society institutions working on water issues

› QUALITATIVE INDICATOR:

**Inclusive and participatory social networks (formal and informal) enable communities to learn from each other, self-organize and collectively act in times of need.**

QUALITATIVE SCORE (2/5):

CONSENSUS SCORE (3/3):


# STRATEGIC VISION

## 2.1 Incorporation of expert and technical knowledge into decision-making around water issues

› QUALITATIVE INDICATOR:

**Technical knowledge is available, understood and continuously incorporated into decision-making around water issues.**

QUALITATIVE SCORE (2/5):



CONSENSUS SCORE (2/3):

## 2.2 Incorporation of local knowledge and culture into decision-making around water

› QUALITATIVE INDICATOR:

**Local knowledge and cultural values of all population groups are referred to in decision-making around water issues.**

QUALITATIVE SCORE (1/3):

CONSENSUS SCORE (3/3):

## 2.3 Incorporation of social, environmental and economic costs and benefits into decision-making around water

› QUALITATIVE INDICATOR:

**The social, environmental and economic impacts of increased water resilience are understood and incorporated into short, medium and long-term decision-making around water issues.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (3/3):

## 2.4 Long-term strategy development and action planning around water

› QUALITATIVE INDICATOR:

**A long-term strategy is in place to guide projects and programmes that build water resilience over time.**

QUALITATIVE SCORE (4/5):



CONSENSUS SCORE (3/3):

## 2.4 Long-term strategy development and action planning around water

› QUANTITATIVE INDICATOR (A):

**Areal size of informal settlements as a percentage of city area**

QUANTITATIVE SCORE: **N/A**

QUANTITATIVE VALUE (2018): **8%**

Data Source: CoCT Research Department

› QUANTITATIVE INDICATOR (B):

**Current population growth rate (% per year)**

QUANTITATIVE SCORE: **N/A**

QUANTITATIVE VALUE (2018): **2.3%**

Data Source: CoCT OPP Research / Cape Town Statistics South Africa Mid-Year Estimates

› QUANTITATIVE INDICATOR (C):

**Forecasted population growth rate (% per year)**

QUANTITATIVE SCORE: **N/A**

QUANTITATIVE VALUE (2018): **1.5%**

Data Source: CoCT OPP Research based on Cape Town Statistics South Africa Mid-Year Estimates

## 2.5 Political leadership around water resilience issues

› QUALITATIVE INDICATOR:

**Political leadership promotes resilience as a priority issue in government decision-making.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (3/3):

# 3 COORDINATED BASIN GOVERNANCE

## 3.1 Proactive coordination around downstream impacts

› QUALITATIVE INDICATOR:

**Coordination between city stakeholders and relevant downstream stakeholders minimize downstream impacts.**

QUALITATIVE SCORE(2/2):



CONSENSUS SCORE(3/3):

## 3.2 Proactive coordination between and within government agencies

› QUALITATIVE INDICATOR (A):

**Coordination between government agencies to define and implement water priorities.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(2/3):



› QUALITATIVE INDICATOR (B):

**Coordination within government agencies to define and implement water priorities.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (2/3):

## 3.3 Proactive coordination between government, private sector and civil society

› QUALITATIVE INDICATOR:

**Frameworks and mechanisms promote dialogue and deliberation around water and resilience issues between government and non-government actors.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (2/3):

## 3.4 Proactive coordination with relevant upstream stakeholders

› QUALITATIVE INDICATOR:

**Frameworks and mechanisms promote coordination between city stakeholders and relevant upstream stakeholders on water issues.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (3/3):

## 3.5 Promotion of clear stakeholder roles and responsibilities

› QUALITATIVE INDICATOR:

**Frameworks and mechanisms clearly define the roles and responsibilities of water stakeholders.**

QUALITATIVE SCORE (3/5):

CONSENSUS SCORE (2/3):

# PLANNING & FINANCE

Strong legal frameworks are in place to support regulation and decision-making around water resources, including public health regulations around drinking water, and procurement processes for water and sanitation infrastructure. Although procurement processes are sometimes slow, on the whole they are viewed as transparent and fair.

Similarly, Cape Town benefits from high technical design standards, technical knowledge and planning capacity. The use innovative new technologies such as desalination and direct-reuse for the purpose of demonstration is promising and can be further explored and incentivised through new standards, better coordination and capacity-building programs targeted at City staff.

There are opportunities for improved coordinated planning between City agencies and other government departments, including with sectors such as energy, agriculture, solid waste management, transportation and housing, which are both influenced by water supply decisions, and which influence how water resources are managed. Land use and urban expansion is monitored, and its impact on infrastructure provision is understood, although parts of the city have insufficient bulk infrastructure, notably wastewater treatment infrastructure, which can limit densification or expansion opportunities. Significant improvement has been made in the collection and accuracy of data since the drought crisis, but more must be done to improve information sharing between agencies and sectors.

Sustainable funding sources are needed for new and existing infrastructure but the City is generally able to provide equitable water and sanitation to all residents. The use of block tariffs and high metering ratio means that people pay according to their level of consumption, which promotes water efficiency. Affordability is considered in tariff setting, and poor households receive subsidies. Clear and transparent guidelines are needed around how tariffs are designed and calculated, and to ensure adequate revenues support the long-term maintenance and upgrades to the water system.


**Qualitative** score for Planning & Finance
**Quantitative** score for Planning & Finance
PLANNING & FINANCE
Effective Regulation and Accountability
3
4.1 Effective implementation of transparent and accountable decision-making procedures
4.2 Enforcement of design guidelines and construction standards for water infrastructure
4.3 Enforcement of land use regulations and zoning
4.4 Effective enforcement of economic regulations for water
4.5 Effective enforcement of environmental regulations for water
4.6 Effective enforcement of public health regulation for water
Adaptive and Integrated Planning
3
5.1 Active monitoring and evaluation of programmes
5.2 Incorporation of redundancy into water sources, networks and assets
5.3 Integrated planning across interdependent urban systems
5.4 Integrated planning with agriculture and food supply chains
5.5 Promotion of culture, processes and resources to enable innovation
5.6 Dissemination of accurate data
Sustainable Funding and Finance
3
6.1 Promotion of integrity in contracting and financial decision-making procedures
6.2 Provision of sufficient financial resources for maintenance of water infrastructure
6.3 Provision of sufficient financial resources for new water programmes and projects
6.4 Water and sanitation pricing for cost recovery and demand management
Effective Disaster Response and Recovery
2.5
7.1 Comprehensive hazard monitoring, forecasting and early warning systems
7.2 Coordination of disaster response and recovery preparation
7.3 Ensuring adequate funds to government for disaster recovery
7.4 Promotion of community capacity for preparedness and response to water hazards
7.5 Ensuring adequate financial resources for recovery of households and businesses
3 3 3 2 4 3 3 2 3 2.5 4 5 N/A
2 2 2 3 3 3 2 5
1 Poor
2 Low
3 Fair
4 Good
5 Optimal

# 4 EFFECTIVE REGULATION AND ACCOUNTABILITY

## 4.1 Effective implementation of transparent and accountable decision-making procedures

› QUALITATIVE INDICATOR:

**Decision-making procedures around water resources management, water and wastewater services are made clear and open to all stakeholders.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

## 4.2 Enforcement of design guidelines and construction standards for water infrastructure

› QUALITATIVE INDICATOR:

**Technical standards and design guidelines define best practice for critical infrastructure.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(2/3):

## 4.3 Enforcement of land use regulations and zoning

› QUALITATIVE INDICATOR:

**A sound regulatory framework controls land use and urban expansion and reduces growth in high-exposure and water-poor areas.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(3/3):

## 4.4 Effective enforcement of economic regulations for water

› QUALITATIVE INDICATOR:

**Economic regulation of water and sanitation services and water resources is performed independently and effectively, resulting in adequate provision of key services, and high customer satisfaction.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(1/3):

## 4.5 Effective enforcement of environmental regulations for water

› QUALITATIVE INDICATOR:

**Environmental regulation is performed independently and effectively, resulting in high quality, protected water environments.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

4.6 Effective enforcement of public health regulation for water

› QUALITATIVE INDICATOR:

**Public health regulations for water is performed independently and effectively, resulting in water that is safe to consume and wastewater that can be returned to the water cycle with minimal environmental impact.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(3/3):

## 5 ADAPTIVE AND INTEGRATED PLANNING

5.1 Active monitoring and evaluation of programmes

› QUALITATIVE INDICATOR:

**Monitoring and evaluation mechanisms and frameworks measure how programmes have achieved intended outcomes and disseminate lessons learned.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

5.2 Incorporation of redundancy into water sources, networks and assets

› QUALITATIVE INDICATOR (A):

**Redundancy exists in the networks and assets responsible for water supply, treatment and sanitation.**

QUALITATIVE SCORE(2/2):

CONSENSUS SCORE(2/3):

› QUALITATIVE INDICATOR (B):

**Redundancy exists in the sources that supply water to the city.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(1/3):

› QUANTITATIVE INDICATOR (A):

**Number of municipal wastewater treatment facilities providing greater than or equal to 20% of total water treatment**

QUANTITATIVE SCORE:

**N/A**

QUANTITATIVE VALUE (2019):

**1**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (B):

### Number of sources providing greater than or equal to 20% of water supply (domestic, commercial and industrial)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **2** |

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (C):

### Number of potable water treatment systems providing greater than or equal to 20% of water supply (domestic, commercial and industrial)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **2** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (D):

### Water source: water from lowland surface water sources (%)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **0%** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (E):

### Water source: water from well sources (%)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **0%** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (F):

### Water source: water from borehole water sources (%)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **5%** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (G):

### Water source: water from upland surface water sources (%)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **95%** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (H):

### Water source: water from saline and brackish water sources (%)

| QUANTITATIVE SCORE: | QUANTITATIVE VALUE (2019): |
|---|---|
| **N/A** | **<1%** |

Data Source: Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (I):

**Water source: water from natural springs and wetlands sources (%)**

QUANTITATIVE SCORE:

**N/A**

QUANTITATIVE VALUE (2019):

**<1%**

Data Source: Data Source: CoCT Department of Water and Sanitation

---

## 5.3 Integrated planning across interdependent urban systems

› QUALITATIVE INDICATOR:

**Coordination exists between public sector water agencies, water utilities and organizations working in related domains such as energy, telecommunications, waste management and transportation.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(3/3):

› QUANTITATIVE INDICATOR:

**Percentage of city population with regular solid waste collection**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE (20XX):

**100%**

Data Source: CoCT Solid Waste Department

---

## 5.4 Integrated planning with agriculture and food supply chains

› QUALITATIVE INDICATOR:

**Coordination exists between water agencies and organizations involved in food supply and production.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(3/3):

---

## 5.5 Promotion of culture, processes and resources to enable innovation

› QUALITATIVE INDICATOR:

*Resources and processes reinforce a culture of innovation within the water section.*

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

### 5.6 Dissemination of accurate data

› QUALITATIVE INDICATOR:

**Accurate data is used by key decision-makers in government, private sector and civil society to promote urban water resilience.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

## 6 SUSTAINABLE FUNDING AND FINANCE

### 6.1 Promotion of integrity in contracting and financial decision-making procedures

› QUALITATIVE INDICATOR:

**Financial procedures promote transparency, minimize risk and ensure that procurement processes are implemented fairly and efficiently.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(2/3):

### 6.2 Provision of sufficient financial resources for maintenance of water infrastructure

› QUALITATIVE INDICATOR:

**Adequate funding exists to maintain existing water infrastructure and to support ongoing programmes.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(3/3):

› QUANTITATIVE INDICATOR:

**Billing efficiency: total number billed for water or sewerage / total number of known water and sewerage connections required to pay charge**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE:

**96%**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR:

**Percentage of non-residential metered connections (customer meters per service connections)**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE:

**100%**

Data Source: CoCT Department of Water and Sanitation

## 6.3 Provision of sufficient financial resources for new water programmes and projects

› QUALITATIVE INDICATOR:

**Adequate funding exists to finance new capital projects and programmes that support water resilience.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

## 6.4 Water and sanitation pricing for cost recovery and demand management

› QUALITATIVE INDICATOR:

**Water tariffs are sustainable and equitable.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

# INFRASTRUCTURE & ECOSYSTEMS

Cape Town performs adequately on indicators related to disaster response and recovery, though improvements are needed to ensure funds are available and to ensure that government works closely with neighbourhood groups and communities to improve their local capacity. Risk readiness should be incorporated into all aspects of government operations and disaster risk management could be better integrated into proactive decision-making before disaster events occur.

The City achieved remarkable efficiencies in promoting sustainable household water use during the crisis, though government and NGOs will need to continue promoting sustainable use through widespread communication efforts and incentives for water users. Financial and human resources are available to operate water infrastructure. Staff is well-trained and human resource strategies are in place, though greater upskilling and integration of skills between organisations could be improved. Infrastructure is generally robust and well-managed, although improvements are needed for wastewater and drainage assets and to ensure water and sanitation infrastructure is present in informal settlements.

The water system is generally well monitored—especially around quality of drinking water, and bulk water and reticulation networks—but significant gaps exist in the City's knowledge of aquatic ecosystems, drainage and groundwater resources. Similarly limited data are available for infrastructure in informal settlements. In spite of high water metering rates, water consumption is rising in the city, and the long-term sustainability of the city's water supply remains a chief concern.

Key challenges relate to protecting aquatic ecosystems, managing pollution and ensuring protections for groundwater resources. More data is needed around environmental and ecosystem monitoring, including the health of rivers, groundwater and environmental services. The data that does exist should be better shared between organisations and sectors working to build water resilience in the city. Though early warning systems are in place, improvements in the City's dissemination of information related to hazard monitoring, forecasting and early warning systems will increase Cape Town's ability to respond to emergencies.

Finally, the holistic benefits of green infrastructure should be better integrated into decision-making generally, and for flood protection planning and synergized with grey infrastructure.

**Quantitative** score for Infrastructure & Ecosystems

**Qualitative** score for Infrastructure & Ecosystems


# EFFECTIVE DISASTER RESPONSE AND RECOVERY

## 7.1 Comprehensive hazard monitoring, forecasting and early warning systems

› QUALITATIVE INDICATOR:

**Monitoring, modelling and early warning systems mitigate hazard risks**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

## 7.2 Coordination of disaster response and recovery preparation

› QUALITATIVE INDICATOR:

**Disaster response and recovery coordination plans and procedures are current, collaborative, well-rehearsed and properly funded.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(3/3):

## 7.3 Ensuring adequate funds to government for disaster recovery

› QUALITATIVE INDICATOR:

**Public authorities have access to funds for disaster recovery.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(3/3):

## 7.4 Promotion of community capacity for preparedness and response to water hazards

› QUALITATIVE INDICATOR:

**Mechanisms promote community preparedness and community-based early warning systems and response to water-related shocks and stresses.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(2/3):

## 7.5 Ensuring adequate financial resources for recovery of households and businesses

› QUALITATIVE INDICATOR:

**Households and businesses have access to sufficient financial resources for recovery and continuity following shock events or persistent stresses.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(3/3):


# EFFECTIVE ASSET MANAGEMENT

## 8.1 Active monitoring and evaluation of water infrastructure

› QUALITATIVE INDICATOR:

**Active monitoring and evaluation of water infrastructure and networks ensures data is current and accurate to help improve performance and reduce likelihood of failure.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE (3/3):

› QUANTITATIVE INDICATOR:

**Non-revenue water by volume (%)**

QUANTITATIVE SCORE (2/5):

QUANTITATIVE VALUE:

**28%**

Data Source: CoCT Department of Water and Sanitation

## 8.2 Ensuring adequate human capacity for operations and implementation

› QUALITATIVE INDICATOR:

**Technical and managerial staff are trained and knowledgeable in areas related to operation of key infrastructure and project implementation.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(2/3):

## 8.3 Promotion of diverse infrastructure for flood protection

› QUALITATIVE INDICATOR:

**'Grey' and 'green' infrastructure provide protection from flooding and ensure adequate urban drainage.**

QUALITATIVE SCORE(2/5):

CONSENSUS SCORE(3/3):

## 8.4 Routine maintenance and upgrade of water infrastructure

› QUALITATIVE INDICATOR:

**Existing infrastructure is regularly maintained and upgraded to reduce likelihood of failure.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE (1/3):


# PROTECTED NATURAL ENVIRONMENTS

## 9.1 Active monitoring and evaluation of environmental resources

› QUALITATIVE INDICATOR:

**Environmental monitoring is conducted to assess the health of water resources.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(2/3):

## 9.2 Promotion of sustainable commercial and industrial water use

› QUALITATIVE INDICATOR:

**Mechanisms encourage sustainable water use for commercial and industrial users.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(1/3):

## 9.3 Promotion of sustainable household water use

› QUALITATIVE INDICATOR:

**Mechanisms encourage sustainable water use for households.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(1/3):

## 9.4 Protection of aquatic habitats and ecosystems

› QUALITATIVE INDICATOR:

**Policies and programmes protect aquatic habitats and ecosystems.**

QUALITATIVE SCORE(1/5):

CONSENSUS SCORE(2/3):

› QUANTITATIVE INDICATOR:

**Percentage wastewater effluent treated in compliance with local quality standards**

QUANTITATIVE SCORE (4/5):

QUANTITATIVE VALUE:

**82%**

Data Source: CoCT Department of Water and Sanitation

## 9.5 Protection of groundwater and surface water resources

› QUALITATIVE INDICATOR:

**Protections exist to prevent over-extraction and reduce or eliminate pollution of surface and groundwater sources.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(3/3):

› QUANTITATIVE INDICATOR:

**Percentage of bodies of water with good ambient water quality**

QUANTITATIVE SCORE (1/5):

QUANTITATIVE VALUE:

**36%**

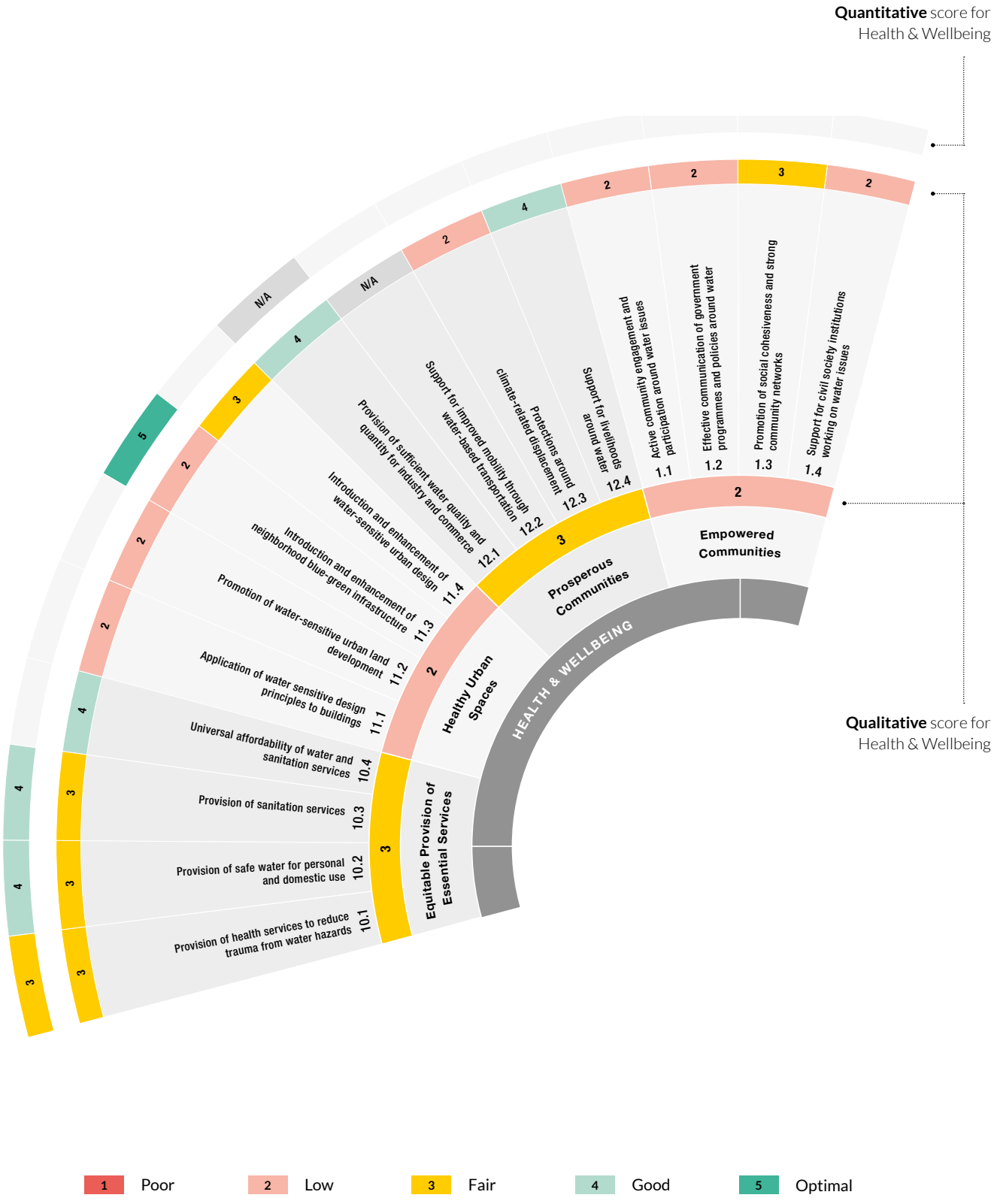
Data Source: CoCT Department of Water and Sanitation

# HEALTH & WELLBEING

Cape Town provides essential water and sanitation services to residents, industry and commercial users at a high level of service quality and coverage. Quality and quantity of water service is generally good throughout the city, though additional efforts are needed to improve accessibility and minimum service levels in informal settlements.

The expansion of informal settlements presents an ongoing challenge, and the quality of universal basic services—notably sanitation services—varies within the city; the operation and maintenance of sanitation infrastructure in informal areas is particularly concerning. There is a need for enforced land-use controls to decrease local communities' risk of exposure to climate-related risks and minimize the likelihood of displacement. The quality of other key services, such as healthcare to respond to water-related illness, vary by income level and location. While upper and middle-income communities may have access to financial resources for recovery, lower income communities often do not. For middle-income families, water affordability can be a concern due to rising tariffs. Opportunities exist to make greater use of non-potable water for industrial purposes, such as textiles and cement production.

Despite some excellent examples of water-sensitive development and innovative pilot projects, the City struggles to implement and maintain comprehensive blue-green infrastructure. Existing successes are largely led by community-based organisations rather than government. Though Cape Town benefits from large areas of natural green space, these amenities may not be accessible to large proportions of the city population, and should be better integrated into the built environment. Similarly, more investment is needed to support recent initiatives to strengthen building-level water efficiency, introduce urban water amenities and promote water sensitive design, including by retrofitting existing buildings. For both new and existing buildings, better enforcement of existing laws—on a continuous basis rather than single points in time—is required to ensure efficient water use and sustainable drainage.


Quantitative score for Health & Wellbeing
Qualitative score for Health & Wellbeing
HEALTH & WELLBEING
Empowered Communities
Prosperous Communities
Healthy Urban Spaces
Equitable Provision of Essential Services
1.1 Active community engagement and participation around water issues
1.2 Effective communication of government programmes and policies around water
1.3 Promotion of social cohesiveness and strong community networks
1.4 Support for civil society institutions working on water issues
12.4 Support for livelihoods around water
12.3 Protections around climate-related displacement
12.2 Support for improved mobility through water-based transportation
12.1 Provision of sufficient water quality and quantity for industry and commerce
11.4 Introduction and enhancement of water-sensitive urban design
11.3 Introduction and enhancement of neighborhood blue-green infrastructure
11.2 Promotion of water-sensitive urban land development
11.1 Application of water sensitive design principles to buildings
10.4 Universal affordability of water and sanitation services
10.3 Provision of sanitation services
10.2 Provision of safe water for personal and domestic use
10.1 Provision of health services to reduce trauma from water hazards
N/A
1 Poor
2 Low
3 Fair
4 Good
5 Optimal


# PROTECTED NATURAL ENVIRONMENTS

## 10.1 Provision of health services to reduce trauma from water hazards

› QUALITATIVE INDICATOR:

**High quality health services are made available to residents to reduce impacts from water-related shocks and stresses, including water-borne diseases**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(3/3):

› QUANTITATIVE INDICATOR (A):

**Under age five mortality per 1,000 live births**

QUANTITATIVE SCORE (3/5):

QUANTITATIVE VALUE (2015):

**24**

Data Source: Western Cape Government / Stats SA

› QUANTITATIVE INDICATOR (B):

**Number of physicians per 100,000 population**

QUANTITATIVE SCORE (3/5):

QUANTITATIVE VALUE:

**71**

Data Source: Western Cape Government Department of Health

› QUANTITATIVE INDICATOR (C):

**Number of mental health practitioners per 100,000 population**

QUANTITATIVE SCORE (4/5):

QUANTITATIVE VALUE (2015):

**13.5**

Data Source: Western Cape Government Department of Health

## 10.2 Provision of safe water for personal and domestic use

› QUALITATIVE INDICATOR:

**All people have access to sufficient, safe and accessible water for personal and domestic use**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(1/3):

› QUANTITATIVE INDICATOR (A):

**Residential consumption (split): Residential water consumption / total water consumption**

QUANTITATIVE SCORE:

**N/A**

QUANTITATIVE VALUE:

**67%**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (B):

**Percentage of population using safely managed drinking water services that is accessible on premises**

QUANTITATIVE SCORE (4/5):



QUANTITATIVE VALUE:

**88%**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (C):

**Intermittent Water Supply (IWS): Population experiencing restrictions to water service**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE:

**<1%**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (D):

**Percentage of water quality compliant with local quality standards**

QUANTITATIVE SCORE (4/5):



QUANTITATIVE VALUE:

**99%**

Data Source: CoCT Department of Water and Sanitation

## 10.3 Provision of sanitation services

› QUALITATIVE INDICATOR:

**All people have access to sanitation that is safe, hygienic, secure, and socially and culturally acceptable.**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(1/3):

› QUANTITATIVE INDICATOR (A):

**Percentage of population with household sewer connections**

QUANTITATIVE SCORE (4/5):



QUANTITATIVE VALUE:

**81%**

Data Source: CoCT Department of Water and Sanitation

› QUANTITATIVE INDICATOR (B):

**Percentage of population using safely managed sanitation services**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE:

**93%**

Data Source: CoCT Department of Water and Sanitation

10.4 Universal affordability of water and sanitation services

› QUALITATIVE INDICATOR (A):

**High quality water for consumption is made affordable to all users.**

QUALITATIVE SCORE(4/5):



CONSENSUS SCORE(2/3):



› QUALITATIVE INDICATOR (B):

**Safely managed sanitation services are made affordable to all users.**

QUALITATIVE SCORE(4/5):



CONSENSUS SCORE(3/3):

## 11 HEALTHY URBAN SPACES

11.1 Application of water sensitive design principles to buildings

› QUALITATIVE INDICATOR:

**Design principles are promoted to improve water performance for buildings.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(2/3):

11.2 Promotion of water-sensitive urban land development

› QUALITATIVE INDICATOR:

**Water is incorporated as a key consideration in land development.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(3/3):

11.3 Introduction and enhancement of neighbourhood blue-green infrastructure

› QUALITATIVE INDICATOR:

**Blue and green infrastructure is widely adopted in neighbourhoods**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(2/3):

› QUANTITATIVE INDICATOR:

**Green area per 100,000 population (hectares)**

QUANTITATIVE SCORE (5/5):

QUANTITATIVE VALUE (2016/2017):

**1 480.5 (Hectares)**

Data Source: CoCT

---

11.4 Introduction and enhancement of water-sensitive urban design

› QUALITATIVE INDICATOR:

**Water is incorporated as a design element in urban place-making**

QUALITATIVE SCORE(3/5):

CONSENSUS SCORE(3/3):

## 12 PROTECTED NATURAL ENVIRONMENTS

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12.1 Provision of sufficient water quality and quantity for industry and commerce

› QUALITATIVE INDICATOR:

**Businesses and industry have access to sufficient water of appropriate quality.**

QUALITATIVE SCORE(4/5):

CONSENSUS SCORE(3/3):

› QUANTITATIVE INDICATOR:

**Commercial and industrial consumption (split): Industrial and commercial consumption / total water consumption**

QUANTITATIVE SCORE:

**N/A**

QUANTITATIVE VALUE:

**19%**

Data Source: CoCT Department of Water and Sanitation

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12.2 Support for improved mobility through water-based transportation

› QUALITATIVE INDICATOR:

**All communities have access to safe and reliable water-related transport where it is feasible to operate.**

QUALITATIVE SCORE:

**NA**

CONSENSUS SCORE:

**NA**

## 12.3 Protections around climate-related displacement

› QUALITATIVE INDICATOR:

**Policies exist that protect vulnerable populations from displacement as a result of water-related shocks and stresses.**

QUALITATIVE SCORE(2/5):



CONSENSUS SCORE(3/3):

## 12.4 Support for livelihoods around water

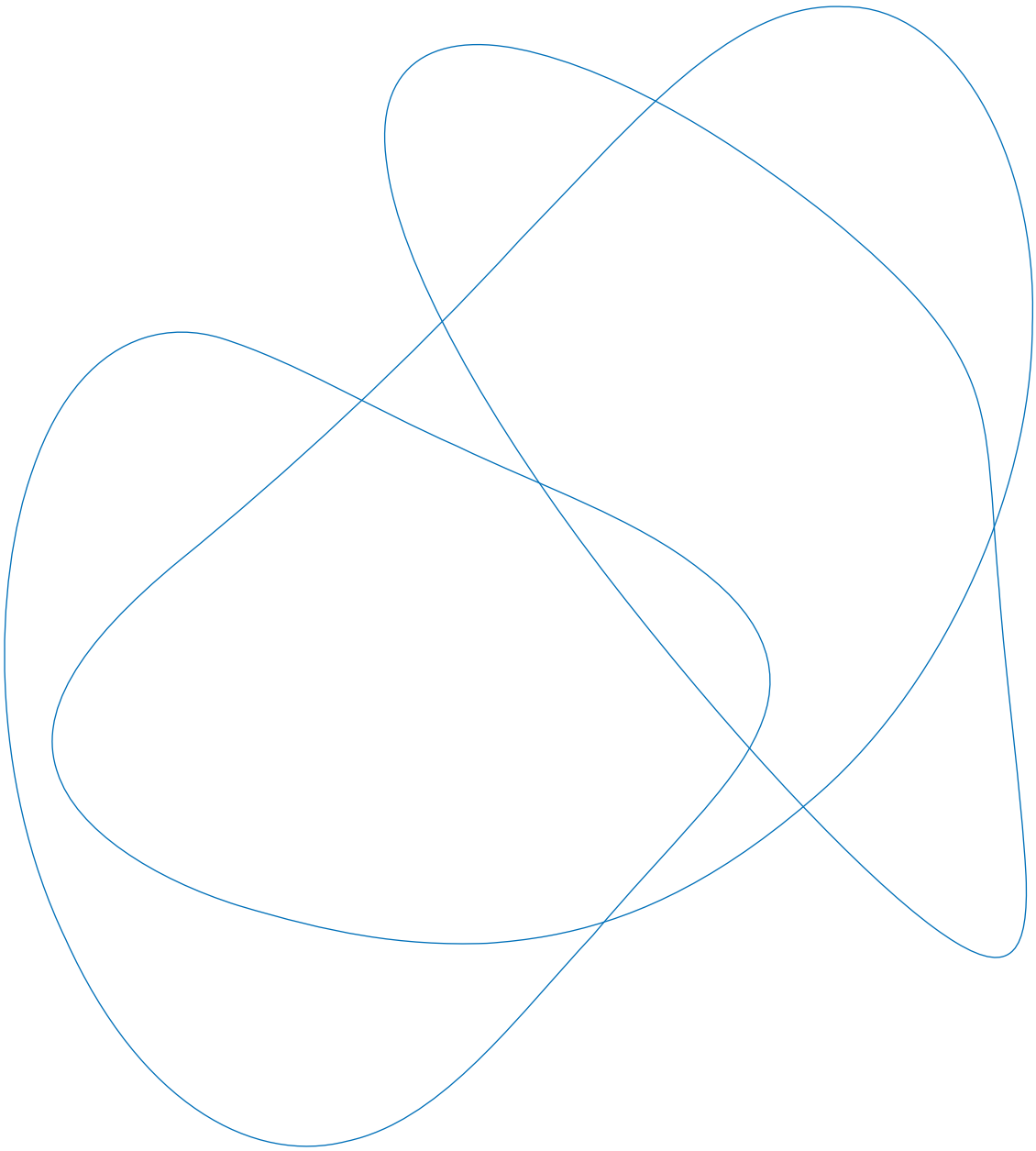
› QUALITATIVE INDICATOR:

**Jobs and skills are developed, and new opportunities created for developing livelihoods around water.**

QUALITATIVE SCORE(4/5):



CONSENSUS SCORE(3/3):



# 3

# ACTION PLANNING

*The Resilience Assessment identified critical challenges confronting Cape Town ("Problem Statements"). The following section presents these challenges, and potential actions developed by workshop participants in response to each problem statement.*

*The project team developed ten problem statements based on analysis of qualitative indicators. From these, stakeholders identified four problem statements to address during the Vision Workshop.*

| | | |
|---|---|---|
| 1 | **Water sensitive design: much spoken about, little seen.** | What barriers must be overcome to get decision-makers to support and implement projects that promote and incorporate water sensitive design principles? What are the immediate steps we must take to overcome those barriers? |
| 2 | **Engagement and collaboration in the urban water system in a low-trust environment.** | Beyond the statutory requirements of public participation, how can we build authentic and trusted engagement mechanisms between all relevant stakeholders in the urban water system? What collaborative efforts can result in co-ownership of decisions and respective actions, and an appreciation for shared risks and benefits? |
| 3 | **Financing water resilience: where do we get the money from?** | How can we ensure that necessary funds are available to build water resilience now and in future, while retaining the commitment to provide water and sanitation services for free to those not able to afford them? |
| 4 | **We are not in it alone!** | How can Cape Town reduce its dependence on the Western Cape Water Supply System (WCWSS) while at the same time helping to develop the capacity of the WCWSS and build trusted partnerships with other users? |
| | **Climate change is real** | How can the City better predict the impacts of climate change and plan accordingly? |
| | **Crisis management before the crisis.** | How can Cape Town be proactive about incorporating disaster risk mitigation efforts into planning now, in anticipation of the next disaster event? Are City leaders doing enough to ensure risk mitigation? |
| | **Share what you know.** | How can we improve information transfer in the Cape Town, between government, researchers and residents? Are there tools that Cape Town should be using to improve dissemination of relevant information to stakeholders? |
| | **Agriculture and urban water stakeholders: We are in this together** | How can we build better relationships that improve respect and appreciation between commercial agriculture and urban water users, encourage a common understanding of shared risks and benefits, and contribute to meaningful action? |
| | **Breaking down institutional barriers: How can we thrive outside silos.** | How can we move from transactional exchanges of what is and what could be, towards collaborative sense-making, idea generation and decision-making processes? |
| | **It's not all about drought** | In addition to the projects and programmes that already exist, how can we build resilience to flooding, particularly in communities most at risk? |

CHALLENGE | VISION | ACTION

CHALLENGE 1

# Water-sensitive design: much spoken about, little seen

The 2019 Cape Town Water Strategy envisions a city that is water sensitive by 2040. This vision represents a significant shift in the way water, water infrastructure and related environmental resources are considered during planning and design within the city, at all scales.

Incorporating water sensitive design into projects increases resilience. It aligns with many of the qualities of resilience, increasing system redundancy and robustness with multiple co-benefits in the form of environmental, social and economic dividends. However, the City is making little progress in getting projects that incorporate water sensitive design off the ground. Cape Town may have the vision, but it lacks a clear pathway to achieving it.

Key questions considered in responding to this challenge include:

- **What are the relevant barriers that need to be overcome in getting decision-makers to support projects for implementation that fully incorporate water sensitive designs?**
- **What are the immediate steps the city needs to take overcome those barriers?**

**This problem statement responds specifically to the following resilience sub-goals:**

- **2.5: Political leadership around water resilience issues** (scored 3 - Fair)
- **5.5: Promotion of culture, processes and resources to enable innovation** (scored 3 - Fair)
- **9.4: Protection of aquatic habitats and ecosystems** (scored 1 - Poor)
- **11.4: Promotion of water sensitive urban development** (scored 2 - Low)
- **11.3: Introduction and enhancement of neighbourhood blue-green infrastructure** (scored 2 - Low)

CHALLENGE | VISION | ACTION

# Celebrating and reconnecting people, nature and water towards achieving a water sensitive city by design

This vision recognises that conventional approaches to urban water management are not sustainable in the long term, and a change in approach is needed. The City recognises that it is important to support an adaptive approach to water management because changes in population size and composition, climate, the economy and technology will influence both water use and availability now and in future. The rehabilitation of urban waterways is crucial to leverage their value for recreation, flood management and water supply. The 2019 Cape Town Water Strategy stresses the importance of integrating natural features into the built environment to enhance the function, beauty, and resilience of the water infrastructure and landscape. However, water-sensitive urban design and land-use planning is not actively promoted, and very few examples exist where design approaches have been employed to minimise environmental degradation and improve aesthetic and recreational appeal.

The following needs were addressed based on the Vision Statement:


- There is a need to change the way the City thinks about water in its urban landscape. Embracing a water-sensitive approach means recognizing the diverse environmental, social and economic benefits this approach brings to public health, community spaces, community and biodiversity.
- Urban water stakeholders need to better understand the water cycle and the impact of water sensitive urban design (WSUD) on stabilising water flows, improving the quality of the water in rivers and streams, reducing the frequency and severity of flooding, reducing the quantity of stormwater entering the sewerage system, protecting physical assets, reducing demand on potable water supply, and enhancing liveability. There is a need to better manage water by sourcing and storing water at appropriate scales.
- Similarly, there is a need to sensitise the public on WSUD to ensure that these design principles are widely understood and accepted. At the core of this lies the vision of transforming engineered concrete drains, canals and reservoirs into clean, vibrant, recreational waterways. Bringing people closer to water will lead them to appreciate and take ownership of this precious resource.
- Water sensitive design should be made a legal planning requirement with a clear set of rules, regulations and guidelines.
- Existing built assets and elements must be retrofitted to enable a complete shift in urban design by 2040. This would include alterations to existing drainage systems to deliver multiple benefits, while at the same time becoming more cost effective to maintain and replace. Stormwater management should be integrated into public open space.
- Public infrastructure should be designed and built according to WSUD best practices.

CHALLENGE | VISION | ACTION

# Action 1: Changing governance structures to mainstream water sensitive design


## Resilient Co-benefits

- Healthy urban spaces
- Effective asset management
- Protected natural environments
- Adaptive and integrated planning
- Coordinated basin governance
- Effective regulation and accountability

### Action description

To begin the transition from traditional, single-function 'grey' infrastructure to multi-functional green infrastructure, the City will review relevant governance structures and policies and identify gaps, challenges and requirements to introduce WSUD into the city landscape.

A review of public policy across the different tiers of government will be undertaken to ensure coherence. Having the right policy framework in place will ensure WSUD is fully considered in all future water decision-making, with a particular focus on stormwater management. This will reduce the amount of rainwater in the city's drainage networks, and minimise flooding and sewage overflows / outfalls into water bodies.

WSUD can effectively divert runoff volumes and pollutant loads to infiltration (where suitable), support urban biodiversity and enhance groundwater resource and baseflow to waterways. To protect the environment and meet legislative requirements, WSUD principles should be applied in the development of new subdivisions, the retrofitting of City assets and neighbourhoods and the assessment of resource consents.

### Who to engage

Organisations to be consulted in realising this action include the City of Cape Town, Professional Registration Bodies, National and Provincial Government, Standards Bodies, the Council for Scientific and Industrial Research (CSIR) and other research institutions, product designers and manufacturers, construction companies and citizens.

### Next Steps

Next steps to implement this action are as follows:

1. Conduct a gap analysis to review of legal and regulatory framework including by-laws, code of practice and standards

2. Review international best practice
3. Conduct policy analysis and stakeholder mapping
4. Compile recommendations that help large and small-scale developers – public and private – to understand the importance of incorporating water-sensitive urban design into water management and land-use considerations
5. Identify partnership opportunities, for example with CBE (Council for Built Environment)
6. Apply for budget and funding for new blue-green infrastructure
7. Identify ways to better engage with the private sector
8. Identify existing grey infrastructure to retrofit to include blue-green infrastructure.

**Outcome**

Resilience dividends include protected and enhanced environmental, social and economic values of downstream environments. The action will result in reduced frequency, duration and volume of stormwater runoff, and reduced demand on potable water supply. It will improve amenity in the urban environment, and local biodiversity and reduce the urban heat island effect. In the long-term it will attenuate climate change.

CHALLENGE | VISION | ACTION

# Action 2: Changing mindsets amongst residents, engineers, policy makers and other who help to make a water sensitive city


## Resilient Co-benefits

- Empowered communities
- Prosperous communities
- Healthy urban spaces
- Effective asset management
- Protected natural environments

### Action Description

The action focuses on educating the public, government and other stakeholders around creating a water-sensitive city. It will involve four distinct workstreams:

- Identify and build demonstration sites in selected locations across the city that can promote interactive education and create awareness
- Work with the national Department of Basic Education (DBE) to integrate water sensitive urban design into curricula in schools, colleges and universities
- Support existing citizen initiatives for reflective peer learning to build capacity understanding and awareness
- Identify opportunities to partner with other cities (e.g. partners in the 100 Resilient Cities network) and engage in peer-to-peer exchanges

### Who to engage

Relevant stakeholders include the Council for Higher Education, City Council, Cape Town Department of Water and Sanitation (DWS), Western Cape Province Government, and networked civil society actors such as Slum Dwellers International (SDI), Southern Africa Wildlife College (SAWC), Cape Town Environmental Education Trust (CTEET), etc.

### Next Steps

Next steps to implement this action are as follows:

1. Launch a consultative process to identify potential demonstration sites in close cooperation with the private sector and local communities.
2. Launch a green infrastructure design competition for local colleges and universities to engage with the next generation of environmental professionals, foster a dialogue about the need for innovative stormwater management techniques, and showcase the environmental, economic, and social benefits of green infrastructure practices. The design challenge will invite students to create green infrastructure designs that can effectively manage stormwater runoff and protect public health and water quality today and in the future.

3. Compile best practices and examples implemented in Cape Town and the region and identify partner cities for peer-to-peer learning and knowledge exchange (preferably from 100RC network of cities).
4. Engage with colleges and universities to identify opportunities to integrate water sensitive urban design into curricula.
5. Create a sensitisation campaign for children to educate other children on water sensitive design including development of an education side.

**Outcome**

Actions will result in a better, more appropriate 'mix' of water used, cleaner rivers and wetlands and better transversal planning of the built environment. It will improve social cohesion and reduce risks to shock events. In the long-term, this initiative will raise awareness of WSUD across all interested parties. It will also build capacity in the City and facilitate partnerships between the public and private sectors.

CHALLENGE | VISION | ACTION

CHALLENGE 2

# Engagement and collaboration in the urban water system in a low-trust environment

The new Cape Town Water Strategy outlines the need for a "whole of society approach" which requires collaboration to achieve the desired outcomes of the strategy. Collaborative relationships are built on trust, and trust is built where there is transparency and mutual accountability, and where stated intentions of all partners are consistently translated into actions.

The City of Cape Town starts this journey at a time of relatively low trust in government. Strong collaboration and partnerships between the City, community organisations, and business were formed to overcome the 2014-2018 drought but these partnerships are unlikely to be sustained organically in the post-drought environment. Further, the relative power and influence of people or organisations determines whose voice is listened to in decision-making.

Key questions considered in responding to this challenge are:

- **Beyond the statutory requirements of public participation, how can we build authentic and trusted engagement mechanisms between all relevant stakeholders in the urban water system?**
- **What collaborative efforts can result in co-ownership of decisions and respective actions, and an appreciation for shared risks and benefits?**

**This problem statement responds specifically to the following resilience sub-goals:**

- **1.1: Active community engagement and participation around water issues** (score 2 - Low)
- **1.4: Promotion of social cohesiveness and strong community networks** (score 2 - Low)
- **2.3: Incorporation of social, environmental and economic benefits into decision-making around water** (score 3 - Fair)
- **3.1: Proactive coordination around downstream impacts** (score 2 - Low)
- **5.6: Dissemination of accurate data** (score 3 - Fair)

CHALLENGE | VISION | ACTION

# Cape Town is a High Trust City with Community Engagement and Pro-Active Partnering to build Social Cohesion and Empowerment across the City

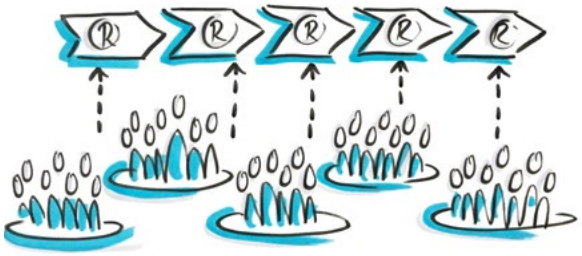
The vision implicitly recognises that residents and businesses lack trust in the City of Cape Town's decision-making around water. Inequality exists in the positions and status of Cape Town's diverse communities. In contrast, the vision imagines a city which is open and transparent with improved collaboration and trust between citizens and public authorities.

The following needs were addressed based on the Vision Statement:

- The City needs to make significant efforts to build trust through community engagement and establishing partnerships that improve water management, while at the same building social cohesion and empowering vulnerable communities.
- Particularly for informal settlements the City needs to find better ways to provide safe water and sanitation services, through processes that build dignity, trust and social cohesion. This will require multidisciplinary approaches that extend beyond the scope and mandate of the water utility on its own.
- Urban water management must be equitable, transparent and inclusive. Although trade-offs are inevitable—especially because water is scarce—the City must establish ways to share benefits and costs in a fair way. It needs to promote measures that are both proactive and adaptive in the face of change, learning to listen to its residents' needs while at the same time adopting a strong customer focus on the utility side.
- The City needs to improve the collection of primary data and information on the urban water system and share that information with all users and the public. In this context it must ensure that information and data is easily accessible and understood, and that it creates new platforms, mechanisms and partnerships for exchange and collaboration.

CHALLENGE | VISION | ACTION

# Action: A new platform empowering each informal settlement to influence the City's budget-setting process



## Resilient Co-benefits

- Empowered communities
- Equitable provision of essential services
- Sustainable Funding and Finance
- Strategic vision
- Adaptive and integrated planning
- Effective regulation and accountability

**Action Description:**

The action will establish a new data platform that hosts essential information on each informal settlement in Cape Town. The platform will contain all necessary data to influence decision-making for improved service provision as well as information required by the City for budgeting processes. The platform will allow public agencies to make decisions based on current data, improve transparency and accountability and allow government officials and the public to better understand the socio-economic context and level of water and sanitation services in informal settlements across the city.

**Who to engage:**

This action needs senior political buy-in from city government. It will require support from sub-councils and ward councillors, relevant community structures and NGOs.

**Next Steps:**

The following next steps are proposed:

1. Identify key implementation partners including allocation of required budgets.
2. Decide which agency will host and maintain the platform and develop updating concept.
3. Develop a comprehensive data collection concept to collect primary data; map the water and sanitation system; and establish a geo-referenced, web-based information system with customised reporting functions based on government requirements.
4. Develop and build the platform.
5. Launch the platform.

CHALLENGE VISION ACTION

**Outcome:**

The platform will allow the City to improve planning and implementation of water and sanitation service provision. It will increase transparency of decision-making and enhance accountability while strengthening regulatory mechanisms and budgeting processes. Improved data collection processes will empower communities and improve their relationship with City government.

CHALLENGE | VISION | ACTION

CHALLENGE 3

# Financing water resilience: Where do we get the money from?

While the City has embarked on a journey to build resilience in the urban water system, the financing of required infrastructure and actions is not yet secure. The absence of sustainable funding mechanisms increases risk and vulnerability of Cape Town to shocks and stresses. Current revenue streams do not cover full costs, resulting in underfunding of planned long-term investment measures, and the City lacks resources to backstop any future calamitous event. Financial support from other spheres of government, including national government, is limited.

Cape Town will have to design infrastructure investment programs based on historical experience and new learning, to ensure that cost-effective approaches are followed. In identifying cost-effective approaches, the City will need to recognise that users often value water differently.

- **How can Cape Town ensure that it has the necessary funds to build water resilience now and in future?**
- **How can we achieve this goal while retaining the commitment to provide affordable water and sanitation services?**

**This problem statement responds specifically to the following resilience sub-goals:**

- **4.4: Effective enforcement of economic regulation for water** (score 2 - Low)
- **6.2: Provision of sufficient financial resources for maintenance of water infrastructure** (score 2 - Low)
- **6.3: Provision of sufficient financial resources for new water programmes and projects** (score 3 - Fair)
- **7.3: Ensuring adequate funds to government for disaster recovery** (score 2 - Low)
- **1.2: Effective communication of government programmes and policies around water** (score 2 - Low)
- **2.3: Incorporation of social, environmental and economic costs and benefits around decision making around water** (score 3 - Fair)

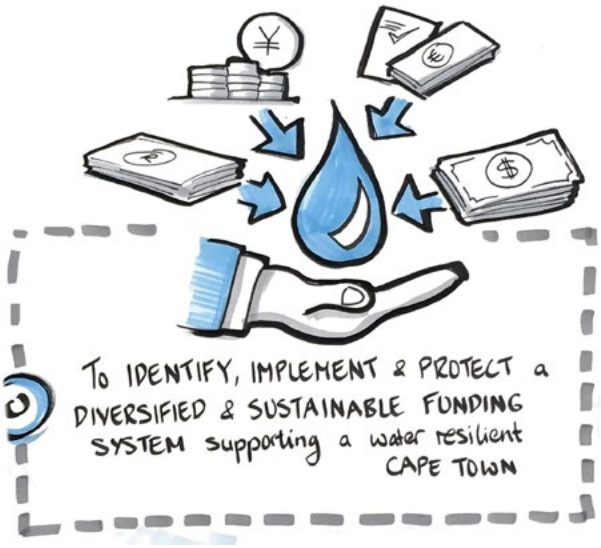
CHALLENGE | VISION | ACTION

# To identify, implement and protect a diversified and sustainable funding system supporting a water resilient Cape Town

The vision recognises that the City lacks sustainable funding streams to close the financing gap for infrastructure investments necessary to build resilience in the water system. It also recognises that the City has not yet diversified its funding and financing modalities. The vision imagines a city that identifies, implements and protects a diversified and sustainable funding system to build resilience.

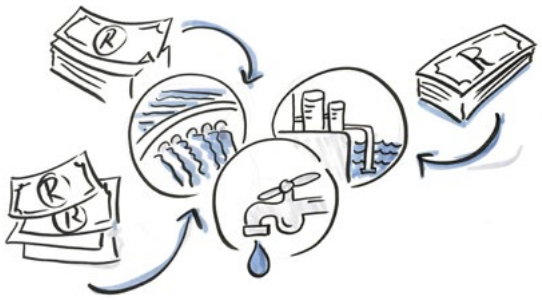
The following needs were addressed based on the Vision Statement:

- There is a need for transparent and predictable water pricing. The City should maintain control over its revenue streams to ensure that sufficient funds are available, and that it can rely on revenue to cover cost and make necessary investments to build water resilience. The City largely depends on customers paying bills based on metered consumption. If customers resort to independent water supply schemes (e.g. private boreholes) there is a risk that system costs cannot be covered. There is therefore a need for a transparent and simple tariff model that is easy to understand, so that users can anticipate the impact their consumption has on monthly water bills.
- Recent tariff changes during the drought crisis have negatively impacted trust in the City's capability to secure long-term water supply to residents, businesses and industry. There is a need to rebuild trust to ensure that funding and financing partnerships can be created, and that the private sector (co-)invests in necessary infrastructure. The water utility needs to build capacity to engage with its customers. Rebuilding this trust will require collaboration across the sector, listening to customers and tackling long-term resilience challenges, including climate change and affordability.
- The City lacks adequate funding for flood management and protection. Urban development alongside canalised rivers increases flood risk within the city. The City currently lacks a stormwater tariff system. Investments to reduce flood risk or improve flood protection are made through rates and grant funding. The City needs to identify additional and sustainable funding opportunities for hard and soft engineering solutions as well as to purchase land to reduce flood risk. Investments in water, wastewater and sanitation infrastructure are critical for Cape Town to build a more resilient water system and require financing. The City needs to build the necessary institutional capacity to bring a call for investment into action.
- The City needs to build capacity in identifying and developing co-financing arrangements. To do this, it should build upon collaborative relationships established during the drought.



CHALLENGE | VISION | ACTION

# Action 1: Designing and establishing an approach to co-funding water infrastructure and services



## Resilient Co-benefits

- Sustainable Funding and Finance
- Effective regulation and accountability
- Strategic vision
- Effective asset management

**Action Description:**

A task force will be established, consisting of departments in city government, local businesses, representatives from the private sector, and selected development finance institutions (DFIs) –including the African Development Bank (AfDB); United States Agency for International Development (USAID); the World Bank; Water, Sanitation and Hygiene Finance (WASH-FIN); and Development Bank of Southern Africa (DBSA). The task force will develop a sustainable approach to co-funding of water infrastructure and services, focusing on opportunities to leverage private sector investments to modernise and expand water and sanitation infrastructure. It will also make recommendations on improving the regulatory framework and provide the City with a coherent set of policy directions that address the allocation of roles, risks and responsibilities, as well as the framework conditions necessary to make the best use of private sector participation. Appropriate capacity building activities will need to be included in realising this action.

**Who to engage:**

This action needs senior political and official buy-in from city government to be achieved. It also needs to involve sub-Councils and ward councillors, relevant community structures and NGOs.

**Next Steps:**

The following next steps are proposed:

1. Set-up a task force.
2. Begin initial discussions around alternative municipal revenue models.
3. Reach agreement through discussions on principles for co-financing.

4. Identify high priority projects to implement.
5. Flash out co-financing options and related benefits, as well as risks.
6. Identify and start building relationships with potential investors.
7. Test implementation of co-financing mechanism based on one selected priority project.
8. Proceed to contracting and implementation.

**Outcome:**

The action will allow the City to diversify its funding sources and therefore increase flexibility to close the financing gap of its investment plan aimed at building water resilience. Successful implementation of projects and financing of critical infrastructure will build trust among stakeholders.

The action can be considered successful if at least one priority project is realised with external finance that meets the goal of increasing quantities of water provided of high quality.

CHALLENGE VISION ACTION

# Action 2: Building trust in government in securing water supply


## Resilient Co-benefits

- Sustainable Funding and Finance
- Effective regulation and accountability
- Empowered communities
- Equitable provision of essential services

**Action Description**

The action is based on a comprehensive communication strategy that uses effective messaging and communicates accurate information. Improved intergovernmental coordination and communication will build trust between government, sector stakeholders and water users (i.e. utility customers), and ensure a cohesive government response. The City will need to develop additional communication resources to realise this action.

**Who to engage**

City, regional and national government working together, with businesses and investors and domestic customers.

**Next Steps**

The following next steps are proposed:

1. Develop a concept to facilitate human behaviour change.
2. Identify a communication strategy to change behaviour.
3. Establish a standing committee on water resilience involving a wide range of stakeholders.
4. Decide on key messages to be delivered.
5. Implement communication plan and measure impact.

**Outcome**

The action will be considered successful in building resilience if one or more of the following conditions are met:

- Enhanced trust in City government leads to an inflow of investment and expansion of infrastructure investments.
- Customers are willing to pay for their water and this provides revenue stability and a potential increase in income to the utility.
- Customers are discouraged to invest in off-grid, private or decentralised solutions.
- Customer complaints are reduced.

This action will allow the City to enhance social stability and establish support structures that build resilience to a crisis. It will build trust in the City and regional government.

CHALLENGE | VISION | ACTION

CHALLENGE 4

# We are not in it alone!

Water catchment boundaries do not coincide with political and administrative boundaries, and yet water is routinely transferred between catchments. A collaborative and partnering approach across neighbourhood, catchment, physical, economic and political boundaries is necessary to build a more resilient future, and to address the challenges at the appropriate scale — whether local, regional or national.

To build water resilience, Cape Town will have to proactively address regional water risks in partnership with other users and key stakeholders through a collaborative approach. This will require that relationships between water users in Cape Town, the Western Cape Water Supply Scheme (WCWSS) and national government change, and that trust is built between different spheres of government. Along with its partners, Cape Town will have to ensure that there is adequate funding for the effective operation and professional management of the system. Creating a more inclusive and robust governance structure for the WCWSS will be important to optimise the economic and social benefits of water, and to improve water resource management approaches and practices to ensure resilient outcomes.

A key question considered in responding to this challenge is:

**How can the City reduce its dependence on the WCWSS to build water resilience while at the same time build trusted partnerships with other users and develop capacity of the WCWSS?**

**This problem statement responds specifically to the following resilience sub-goals:**

- **2.4: Long-term strategy development and action planning around water** (score 4 - Good)
- **2.5: Political leadership around water resilience issues** (score 3 - Fair)
- **3.2: Proactive coordination between government agencies** (score 2 - Poor)
- **3.5: Promotion of clear roles and responsibilities** (score 3 - Fair)
- **5.2: Incorporation of redundancy into water sources, networks and assets** (score 2 - Poor)
- **6.2: Provision of sufficient financial resources for maintenance of water infrastructure** (score 2 - Poor)
- **8.2: Ensuring adequate human capacity for operations and implementation** (score 4 - Good)
- **8.4: Routine maintenance and upgrade of water infrastructure** (score 4 - Good)
- **9.5 Protection of groundwater and surface water resources** (score 2 - Poor)

CHALLENGE | VISION | ACTION

# Greater Cape Town is globally recognised for its sustainable water management, which optimises the water resources for the economic, social and environmental benefit of all

The vision recognises that the City needs to improve water management to ensure that it can meet the water demand of all citizens, businesses and industries now and in future. The vision imagines a Cape Town that values water and wastewater as a resource and moves towards a more circular economy by using these resources more efficiently, reducing waste, encouraging re-use and increasing recycling.

The following needs were addressed based on the Vision Statement:

- The City needs to build strong relationships and collaborations through integrated and adaptive planning with residents and the business community, as well as with other government entities to improve urban water management. The City must work with national and regional government as well as the other WCWSS users in developing a secure and fair approach to the allocation of water rights that is transparent and adheres to existing legal agreements. The City needs to continue to play an active role in improving regional water management and governance.
- Together with regional government and other water users, the City needs to work on a shared risk management approach that benefits all water users. This should be done over the longer term to optimise sustainable water resource management for all regional stakeholders.
- The City needs to develop a concept to further promote water efficiency and the treatment and reuse of water (including through a sustainable incentives scheme). The water utility has a core role to play by substantially improving customer management and engagement. The City needs to better engage with its citizens, supporting active citizen participation in decision-making and recognising that there are different forms of engagement and knowledge available across the city network. Strong community systems and structures should be facilitated, to build trust across social, economic and political spaces.
- The City needs to better understand current and future needs and develop sound infrastructure investment plans that respond to these needs. Investment planning and budgeting need to be aligned and information made publicly available.
- Technology should be adaptive and responsive to needs and unlock efficiencies within the water system.
- In general, greater accountability is required throughout the system.

CHALLENGE VISION ACTION

# Action 1: Develop an adaptive master programme


## Resilient Co-benefits

- Adaptive and integrated planning
- Sustainable Funding and Finance
- Strategic vision
- Equitable Provision of Essential Services

**Action Description**

This action will revisit master planning of utilities that supply water and sanitation services in Cape Town to identify, define and reconfirm efficiency and optimisation opportunities and to provide better and more sustainable services now and in future. Planning for the future is the decisive way to build resilience in the face of a changing climate. The preparation of a Utility Master Plan is essential for utilities and infrastructure planning. It will facilitate early and informed decision making that will ensure that the City saves on capital and long-term operational costs. The Utility Master Plan is a critical planning document used by the city to identify existing infrastructure improvements required to maintain levels of services as well as the infrastructure required to support growth for the next 20 years. It focuses on storm, water and sanitation infrastructure, and should be aligned with future land use scenarios and demographic projections to consider demand and water supply as well as infrastructure needs. Decisions made through this process will be reflected in an investment plan for 2021-2040.

A Utility Master Plan will support the success of Cape Town's water and wastewater and stormwater systems and enable implementation of facilities and system planning of individual utility components. It will help the City identify supply, distribution and collection challenges and suggest practical and effective solutions that integrate existing and future land use. It will also allow the City to comprehensively measure the impacts of urban growth on water and wastewater services, and to identify deficiencies in existing utility data necessary for the development of a capital improvement plan.

**Who to engage**

This action needs senior political and official buy-in from City government, notably the Department of Water and Sanitation, as well as national and regional governments.

**Next Steps**

1. Define scope of review.
2. Establish effective coordination mechanisms.
3. Revisit master planning of utilities (water and sanitation).
4. Define and reconfirm efficiency and optimisation opportunities.
5. Benchmark against land use scenario (current vs. future) and demographics (5.8 million people in 2040) and future projections.
6. Consider demand and sequencing of infrastructure (bulk).
7. Determine cost.
8. Declare investment programme 2021 to 2040.

**Outcome**

A new or revised investment or capital improvement programme will provide clarity in scope and cost and will consider anticipated water demand and possible future growth (long-term). It will build on the work of the Growth Management Working Group and the existing Infrastructure Investment Programme. It will incorporate the strategic management framework and consider the 2018-2019 Built Environment Performance Plan (BEPP).

The action will be considered successful in building resilience if engineers, planners and financiers agree to a new investment programme that is properly costed and resourced. The investment program needs to survive political cycles and the content needs to be “non-negotiable” to reduce short-term decision-making.

CHALLENGE VISION ACTION

# Action 2: Develop a decision support system to enable effective management and optimisation of resource


## Resilient Co-benefits

- Prosperous communities
- Adaptive and integrated planning
- Coordinated basin governance

**Action Description**

A decision support system will be developed to enable effective management and optimisation of water resources . As the biggest water user in the system (in both water allocation and infrastructure) the City will work collaboratively with stakeholders and partners to enhance integrated planning with other actors in the WCWSS and the region through the development of a decision support system. The decision support system will improve the analytical information-base for water resource management decisions and allow the City to build stronger relationships between the key stakeholders through the process of sharing expertise, information, infrastructure, and finances to ensure better planning and cost-effective investments. In the long-term, transparent and informed decision-making for water allocation and management will improve water resource management.

**Who to engage**

This action needs senior political and official buy-in from City government, notably the Department of Water and Sanitation, the national Department of Water Affairs, neighbouring municipalities and commercial agriculture.

**Next Steps**

The following next steps were proposed:

1. Procure IT systems and analytical software
2. Develop analytical tools and frameworks
3. Secure relevant human resources
4. Operationalise the system
5. Share information with others

**Outcome**

The new decision support system will provide more confidence in decision making. It will allow public agencies to optimise the use and allocation of water resources while at the same time strengthening monitoring and evaluation processes of the Western Cape Water Supply System. It will ensure more robust and transparent management of system water resources.

CHALLENGE VISION ACTION

# Action 3: Design towards net zero thinking: Promote micro-scale construction projects to be off the grid


## Resilient Co-benefits

- Healthy Urban Spaces
- Equitable Provision of Essential Services
- Adaptive and Integrated Planning
- Effective Asset Management

### Action Description

The action supports small-scale off-the-grid solutions and promotes the concept of "net zero water" buildings, in which water needs are supplied 100% from harvested rainwater or water recycled on-site. The new construction or retrofitting of buildings will allow for 'closing the resource loop' by mimicking nature or the water cycle. Reducing indoor and outdoor water use is a key element to the proposed action. The action will enhance cooperation with the private sector and developers, utilize private sector funding to create water sensitive homes and buildings through the use of water efficient fixtures, water recycling and alternative water supplies, water-smart landscaping and reduced impervious footprints.

### Who to engage

To further develop the action, buy-in is required from the Green Building Council. Support from built-environment professionals and key technical experts, including academia, will help promote innovative off-grid development.

### Next Steps

The following next steps were proposed:

1. Compile ideas, existing concepts and best practice examples
2. Undertake design development
3. Continue to expand on existing net-zero projects and adapt the water network for new net-zero projects

### Outcome

The action will reduce overall water consumption from the public network and will promote the reuse of wastewater according to a circular economy approach. It will increase the use value of wastewater and enhance people's respect for a scarce resource. The proposed action will reduce the impact of the built environment on human health and the natural environment by reducing water consumption, encouraging water re-use and recycling and reduce pollution. It will also reduce water bills for customers, and reduce overall demand on water sources.

CHALLENGE VISION ACTION

# Action 4: Build mutual understanding between commercial farmers and citizens/CBOs around the links between food, water and livelihoods.

### Resilient Co-benefits

- Prosperous Communities
- Adaptive and Integrated Planning
- Coordinated Basin Governance

**Action Description**

The action will improve engagement between food producers, government and communities It requires active facilitation by independent facilitators and buy-in from agricultural associations, the Western Cape Water Supply System, community-based organisations and the city government.

**Who to engage**

For the action to be further developed and implemented, approval or buy-in is required from the Provincial Department of Agriculture, Agri Western Cape, the Western Cape Education Department, City Department of Water and Sanitation, City Department of Resilience and community-based organisations.

**Next Steps**

The following next steps were proposed:

1. Design a full brief
2. Prepare a stakeholder map
3. Pilot engagements between various sectors
4. Determine common values between sectors
5. Develop the story line that binds all sectors
6. Leverage the story in workshops with stakeholders

**Outcome**

The action will build mutual trust between commercial farmers, citizens, community-based organisations and government officials around the links between food, water and livelihoods.

# 4

# NEXT STEPS

*The recent water story of Cape Town is probably one of the most well-known urban water stories in the world today. It is the story of a city of over 4 million people that was confronted with a severe multi-year drought that took the city to the brink of the Day Zero scenario, the day the reticulation system would have been turned off if dam levels had reached critical levels. However, the households and businesses of Cape Town, working together, reduced consumption of water by approximately 50% compared with pre-drought levels in a short period of time in order to avoid critical water shortages. This will not be the last severe drought shock experienced by the city and many lessons will have been learnt by all sectors of society on how to better prepare for similar events in the future.*

*It is to be expected that for a city that just navigated itself through a drought, that stakeholders participating in the assessment methodology under City Water Resilience Framework (CWRF) would highlight Cape Town's experience with the drought. There is during occasions like this potential for the problem of recency bias to creep into assessments. To some extent this was evident in the assessment workshops, and the comments by participants summarised in the annexure of this report, confirm this. Nevertheless, one of the benefits of using the CWRF is that stakeholders in the water sector are forced to consider a much wider range of water-related shocks and stresses. Notwithstanding the importance of building resilience to future droughts, Cape Town cannot afford to divert its attention from building resilience to flood shocks or from increasing long-term financial sustainability and improving access to water and sanitation in informal settlements.*

*The CWRF provides a large system approach to Cape Town. While many participants in the assessment gravitated towards assessing the City government, the methodology encourages participants to look at the whole system. In this regard the water resilience profile produced in this report should be viewed as that of Cape Town, inclusive of its households, businesses, civil society organisations and spheres of government.*

On the whole Cape Town fairs well in terms of comprehensive water resilience. However, the CWRF has identified focus areas where leaders from across the water sector in Cape Town can work together to improve outcomes.

### EMPOWERED COMMUNITIES

Notwithstanding the efforts of Capetonians to reduce water consumption during the drought, an ongoing effort is needed for improved and authentic engagement between government and communities. Mutual trust-building efforts should be embarked upon, co-design of water projects and programmes should be encouraged, and the way different people value water should be included in decision-making.

### HEALTHY URBAN SPACES

There is significant potential for upscaling water-sensitive design features in buildings and urban spaces. There are multiple resilience dividends that can be achieved by investing in blue-green infrastructure. This is a space where the burden of investment can be shared between government, households and businesses.

### PROTECTED NATURAL ENVIRONMENTS

The expanding and densifying urban context of Cape Town poses risks to the city's waterways and groundwater resources. The regulatory environment is sound, but there needs to better enforcement by a number of government agencies. There is significant potential here for partnerships between government, academia and civil society organisations.

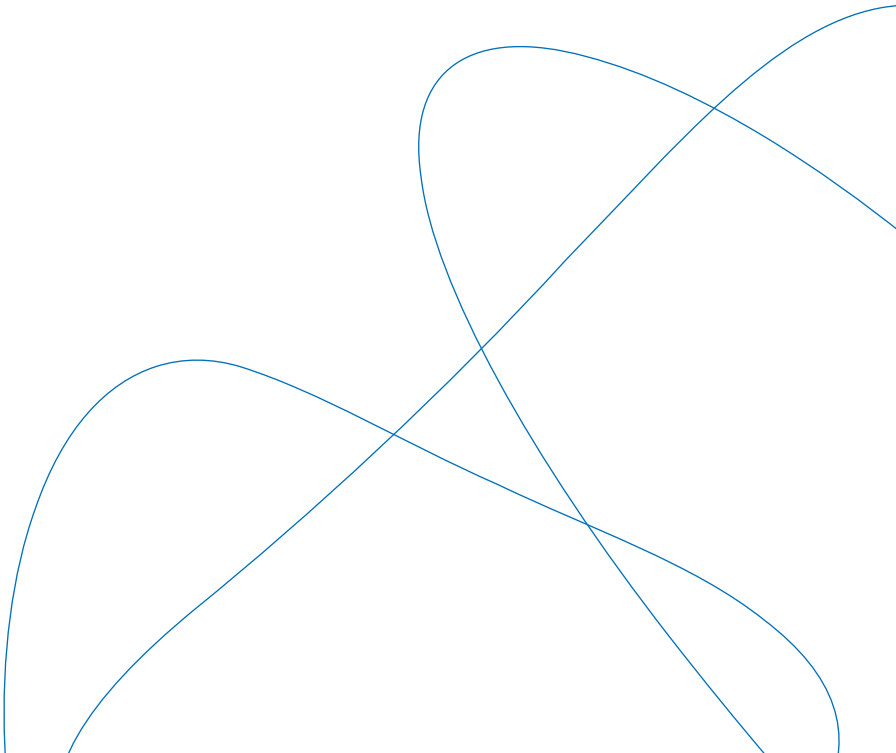
### EFFECTIVE DISASTER RESPONSE AND RECOVERY

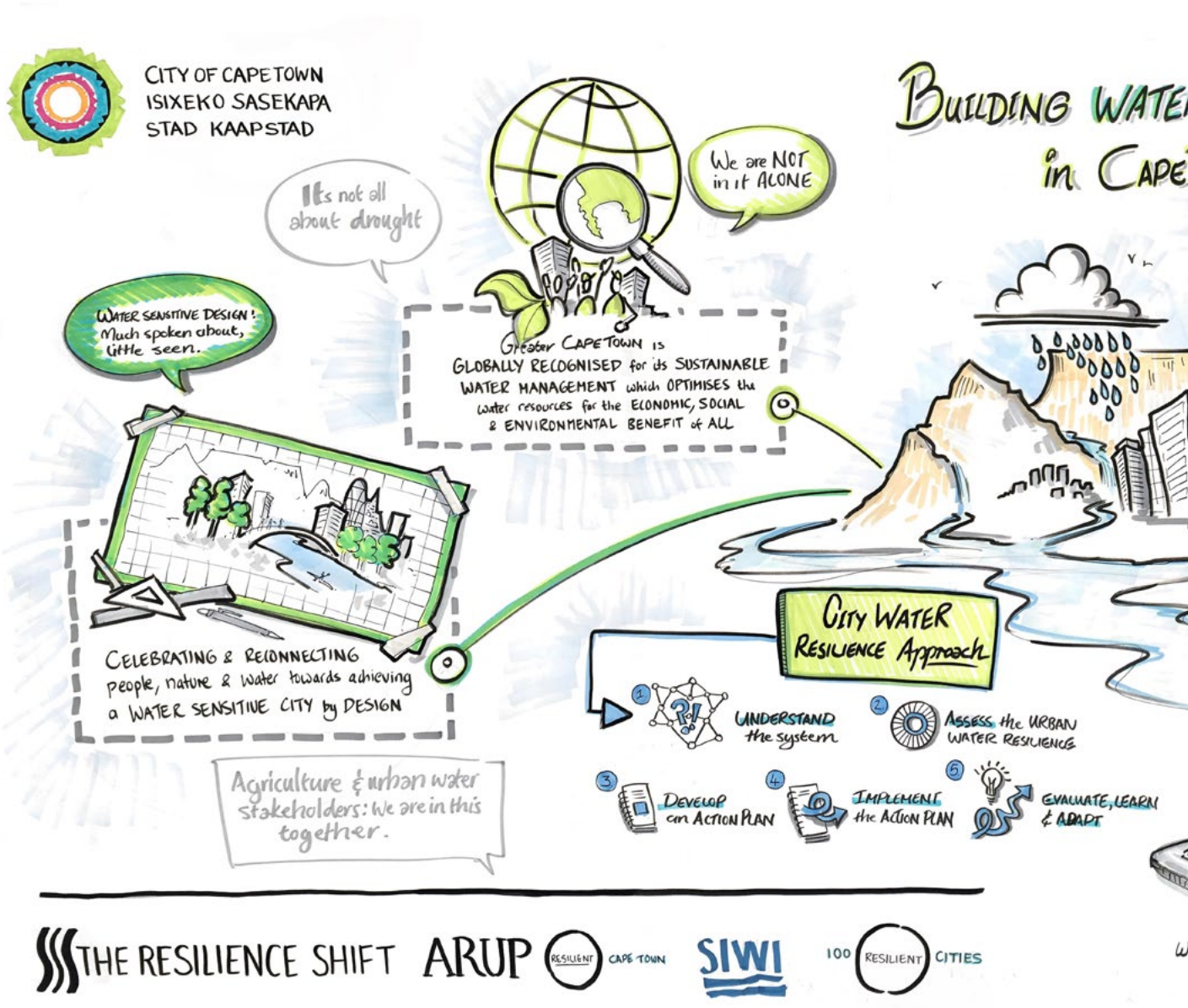
There is limited funding available for recovery from widespread water-related disasters in Cape Town. All three spheres of government should understand the risks of shock events, particularly in the context of a rapidly changing climate, and find ways to fund recovery when the need arises. There are a number of communities in the city with high vulnerability to shock events, notably localised flooding, and efforts should be increased to support these communities in both preparation for and recovery from shock events.

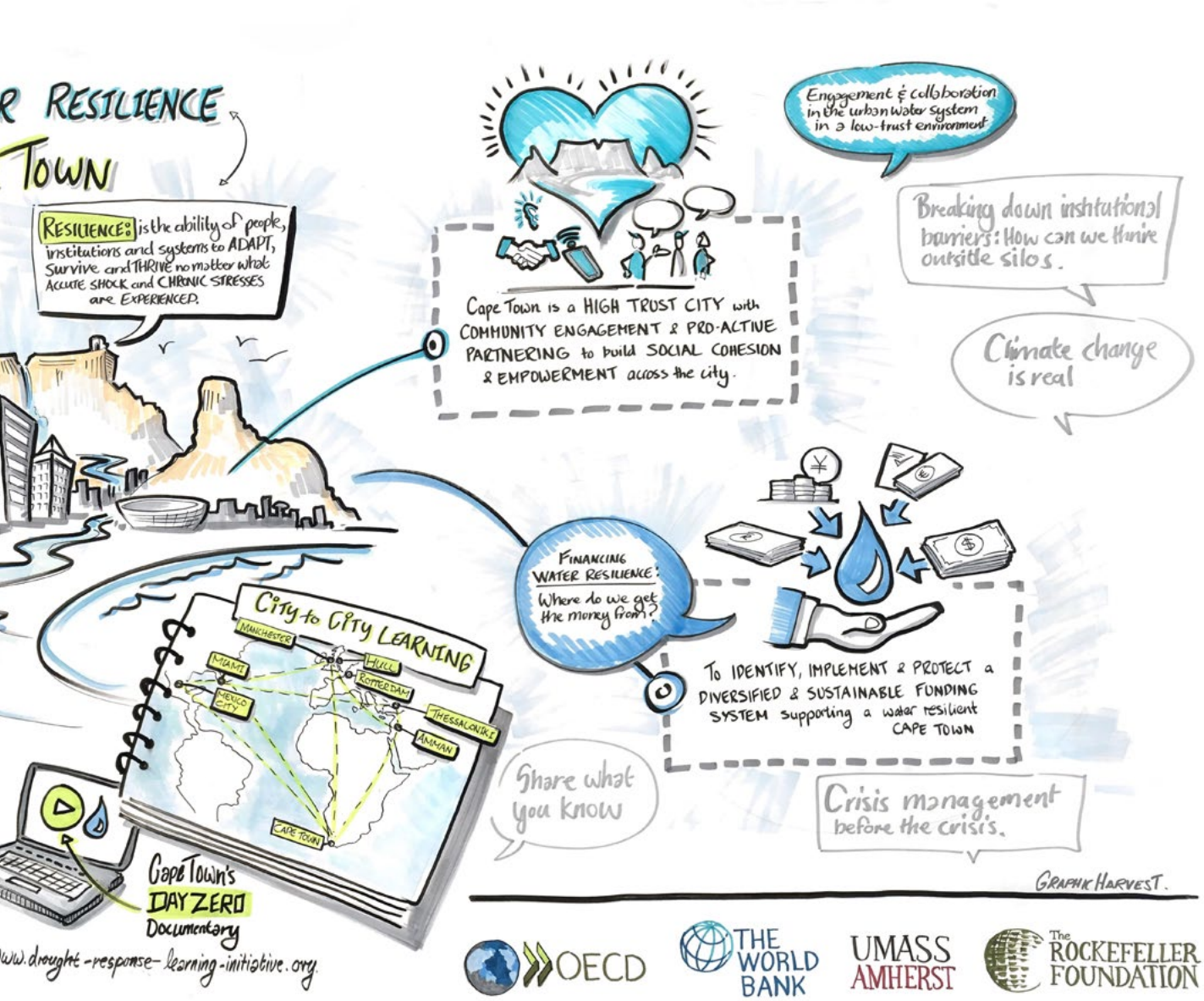
The results of the assessment workshops align well with the commitments in the new Cape Town Water Strategy, which include safe access to water and sanitation, wise water use, the provision of sufficient, reliable water from diverse sources, the sharing of benefits between users of regional water resources, and the progressive realisation of a water sensitive city. Perhaps most importantly, the Water Strategy acknowledges that implementation of actions contained therein depends on the actions of all people and institutions in the city.

Insights gained from the CWRF for Cape Town can be considered for inclusion in the implementation plan for the Water Strategy.

Similarly, the newly approved Cape Town Resilience Strategy offers another opportunity for insights from the CWRF to be included in the development of actions that promote multiple resilience dividends. There is momentum in Cape Town to continue building water resilience. Cape Town is a city which is thinking about water. Participants from a number of sectors that were present at the assessment workshops were engaged and knowledgeable. This is a strength of Cape Town which it can leverage off to further improve water resilience.




CITY OF CAPETOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD
BUILDING WATER
in CAPE
It's not all about drought
We are NOT in it ALONE
WATER SENSITIVE DESIGN! Much spoken about, little seen.
Greater CAPETOWN is GLOBALLY RECOGNISED for its SUSTAINABLE WATER MANAGEMENT which OPTIMISES the water resources for the ECONOMIC, SOCIAL & ENVIRONMENTAL BENEFIT of ALL
CELEBRATING & RECONNECTING people, nature & water towards achieving a WATER SENSITIVE CITY by DESIGN
Agriculture & urban water stakeholders: We are in this together.
CITY WATER RESILIENCE Approach
1. UNDERSTAND the system
2. ASSESS the URBAN WATER RESILIENCE
3. DEVELOP an ACTION PLAN
4. IMPLEMENT the ACTION PLAN
5. EVALUATE, LEARN & ADAPT
THE RESILIENCE SHIFT
ARUP
RESILIENT CAPE TOWN
SIWI
100 RESILIENT CITIES


R RESILIENCE
TOWN
RESILIENCE is the ability of people, institutions and systems to ADAPT, Survive and THRIVE no matter what ACUTE SHOCK and CHRONIC STRESSES are EXPERIENCED.
Cape Town is a HIGH TRUST CITY with COMMUNITY ENGAGEMENT & PRO-ACTIVE PARTNERING to build SOCIAL COHESION & EMPOWERMENT across the city.
Engagement & collaboration in the urban water system in a low-trust environment
Breaking down institutional barriers: How can we thrive outside silos.
Climate change is real
FINANCING WATER RESILIENCE: Where do we get the money from?
To IDENTIFY, IMPLEMENT & PROTECT a DIVERSIFIED & SUSTAINABLE FUNDING SYSTEM supporting a water resilient CAPE TOWN
City to City LEARNING
MANCHESTER
MIAMI
HULL
ROTTERDAM
MEXICO CITY
THESSALONIKI
AMMAN
CAPE TOWN
Share what you know
Crisis management before the crisis.
Cape Town's DAY ZERO Documentary
www.drought-response-learning-initiative.org
GRAPHIC HARVEST.
OECD
THE WORLD BANK
UMASS AMHERST
The ROCKEFELLER FOUNDATION

# APPENDIX A:
# INDICATOR ROUNDTABLE DISCUSSIONS

*This appendix provides a summary of key themes identified for each indicator during round-table discussions, and scoring results for each indicator. The themes identified in each discussion, and qualitative scoring results for indicators reflect the opinions of individual participants. A strong effort was made to bring together participants with diverse and technical expertise and knowledge of the subject areas.*


# EMPOWERED COMMUNITIES

## 1.1 Active community engagement and participation around water issues

› QUALITATIVE INDICATOR:

*Legal and institutional frameworks and mechanisms promote active, free and meaningful participation around issues related to water supply, sanitation, drainage and flooding.*

Community engagement improved during the latter stages of the drought crisis, but participation and engagement remains heavily weighted to middle-class water users, large organisations, and stakeholders who are vocal and outspoken on social media platforms. Community groups are not always fully recognized by the City or given opportunity to meaningfully influence decision-making around water issues; bureaucratic processes can limit free-flowing dialogue and limited opportunities exist for meaningful participation. The City can be more creative and deliberate about promoting inclusiveness in engagement, including through the use of independent bodies that represent community groups and give voice to consumers.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

## 1.2 Effective communication of government programmes and policies around water

› QUALITATIVE INDICATOR:

*Mechanisms ensure that comprehensive information on government programmes and policies are disseminated to all stakeholders*

Among workshop participants, there were mixed views on the efficacy of official City communications during the drought crisis, although there was acknowledgement that there were multiple tactics used and a strong urgency to reach as many residents with useful information as possible. There were mixed views on the efficacy of the "Day Zero" campaign. Looking beyond the drought, participants noted that although there is a large amount of information made available on the City website, the site is difficult to navigate, and is not always intuitive or user-friendly. (Making information available online also assumes that people have internet access.) Communication needs are often poorly understood and as such, official communications are not targeted or tailored sufficiently well. The City should be more creative about communicating information, and could build trust in City government by regularly sharing technical information as it did in the latter stages of the drought crisis.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 1

## 1.3 Support for civil society institutions working on water issues

› QUALITATIVE INDICATOR:

*Mechanisms ensure that financial, institutional and technical support is provided to civil society institutions working on water issues*

Despite improvements over the past three years, an opportunity still exists for better partnerships between civil society organisations (CSOs) and the City government. In Cape Town there are relatively few CSOs that work specifically around water: there are those who work with backyarders and in informal settlements to provide a voice to residents—e.g. Slum Dwellers International (SDI), the Community Organisation Resource Centre (CORC), Social Justice Coalition (SJC)—and those who promote natural resources and environmental health—e.g. WWF South Africa, Friends of the Liesbeek, Cape Town Environmental Education Trust (CTEET). Although some CSOs have the ear of City government, others may be excluded and/or frozen out institutionally from participation. As a result, CSOs tend to work more closely with academic institutions rather than City government.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

### 1.4 Promotion of social cohesiveness and strong community networks

› QUALITATIVE INDICATOR:

*Inclusive and participatory social networks (formal and informal) enable communities to learn from each other, self-organize and act collectively in times of need.*

Numerous active community groups operate in Cape Town, but many of these are not officially recognised or valued by government. During the drought crisis, community groups arose that built off already pre-existing groups (e.g. neighbourhood watches or security groups) and some created new relationships for self-organization and collective action. However, social networks remain segmented across the city, reflecting the reality that communities in Cape Town are highly fragmented. Residents of informal settlements are often highly self-reliant and self-organised. To encourage strong social networks, agencies within City government could be more collaborative and better resourced; during the drought crisis, a large number of engagement responsibilities were made the responsibility of a small number of staff, which limited opportunities for meaningful collaboration.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3


# STRATEGIC VISION

## 2.1 Incorporation of expert and technical knowledge into decision-making around water

› QUALITATIVE INDICATOR:

*Technical knowledge is available, understood and continuously incorporated into decision-making around water issues.*

There is a strong community of practice in Cape Town with well-established academic institutions (such as the University of Cape Town, the University of the Western Cape, University of Stellenbosch, and the Cape Peninsula University of Technology) that create a two-way flow of technical information between academia and policy-makers. Initiatives are in place that aim to encourage information flow and academic practitioners participating in certain City Committees such as the Section 80 Water Resilience Advisory Committee. Additionally, the City is trying to make technical knowledge available with the adoption of the new Data Strategy and the ongoing provision of data sets through the Open Data Portal. Ultimately, however, the incorporation of technical information into decision-making is not universally formalised. In some areas, such as flooding and storm water, information is now several years out of date and knowledge is patchy. Similarly, storm water masterplans are out-of-date for many areas. There is room for improvement in evidence-based decision-making.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

## 2.2 Incorporation of local knowledge and culture into decision-making around water

› QUALITATIVE INDICATOR:

*Local knowledge and cultural values of all population groups are referred to in decision-making around water issues.*

City government decisions are often made in a top-down and bureaucratic way, and a stronger culture of listening or collaboration is needed. (This reality is sector-agnostic and not unique to the water sector.) New mechanisms are needed to involve community groups and encourage community inputs into decision-making. The City government should be proactive in seeking the views of groups of people who are marginalized in society.

QUALITATIVE SCORE: 1 | CONSENSUS SCORE: 3

## 2.3 Incorporation of social, environmental and economic costs and benefits into decision-making around water

› QUALITATIVE INDICATOR:

*The social, environmental and economic impacts of increased water resilience are understood and incorporated into short, medium and long-term decision-making around water issues.*

Since the drought crisis, progress has been made in incorporating multiple costs and benefits into decision-making. In particular, economic benefits are now better understood and integrated more systematically into decision-making, and environmental benefits are also relatively well-understood in Cape Town. However, stormwater is not sufficiently considered in management of the overall water system and decision-making around infrastructure investments. Social benefits are also still not adequately factored into decision-making. In general, there needs to be improvement in the practice of benefits-tracking of all water investments made by the City government.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

## 2.4 Long-term strategy development and action planning around water

› QUALITATIVE INDICATOR:

*A long-term strategy is in place to guide projects and programmes that build water resilience over time.*

The development and adoption of the new city-wide Water Strategy with a strong and aspirational vision statement demonstrates a strong degree of political willingness and commitment to a more holistic approach to integrated water management. The Strategy is robust in its stated actions to achieve increased water resilience, although it lacks a clear pathway on becoming water-sensitive. The accompanying implementation plans will need to outline in more details the portfolio of projects required over the long-term. Key to delivering all the commitments in the Water Strategy will be a major change-management initiative in the City's Water Department in order to improve on its capabilities to collaborate and partner with a wider range of city and regional water stakeholders.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 3

## 2.5 Political leadership around water issues

› QUALITATIVE INDICATOR:

*Political leadership promotes resilience as a priority issue in government decision-making.*

Resilience as a concept is becoming more widely adopted within City government and it is notable that resilience is included as a guiding principle of the Integrated Development Plan (2017-2022) and features in the vision of the new city-wide Water Strategy. Building water resilience became a dominant narrative at the height of the drought crisis and emergency actions corresponded with many of the qualities of resilience including flexibility and robustness. There is a concern however that the traction for building resilience gained during the drought crisis could dissipate once the crisis has passed. Further, the focus on building resilience to drought should not be allowed to take attention away from building resilience to the other water-related shock relevant to the city, which is flooding. Willingness to engage in resilience-building exercises, such as the City Water Resilience Assessment and the development of the Cape Town Resilience Strategy, indicates political will. Ultimately, commitment will need to be shown in the allocation of budgets for projects that build water resilience in the medium to long-term, most notably at times not driven by water-related crises.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3


# COORDINATED BASIN GOVERNANCE

## 3.1 Proactive coordination around downstream impacts

› QUALITATIVE INDICATOR:

*Coordination between city stakeholders and relevant downstream stakeholders minimize downstream impacts.*

The City government and Cape Town's scientific community generate decent baseline information around downstream impacts, and a legal framework exists to define stakeholder roles. However, legal mechanisms and governance arrangements are not always well-defined (including, for example, around ensuring water quality and creating guidelines for water abstraction and water reuse) and there is a lack of sufficient resources to support coordination between users. For instance, limited funding exists for upgrading wastewater treatment plants to higher standards, and additional resources are needed to support river management and fund programmes such as "Source to Sea," which could have multiple positive local impacts if properly resourced. Although water quality measurement of river water and groundwater is performed often, resulting actions can be slow to materialize. Stronger regulatory enforcement is required by the national Department of Water and Sanitation (DWS). Finally, an often adversarial relationship exists between the City and scientific community over results of studies and what action should be taken as a result.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

## 3.2 Proactive coordination between and within government agencies

› QUALITATIVE INDICATOR (A):

*Coordination exists between different government agencies operating at various administrative levels to define and implement water priorities.*

Different spheres of government have varying constitutional responsibilities with regard to the management of water. These responsibilities are expected to complement each other in the spirit of intergovernmental relations. Coordination between spheres of government and different municipalities was generally successful during the crisis. Participants at the assessment workshop generally held the view that the extent of coordination varies between different agencies and departments, but performance is generally better within than between agencies. Within the Western Cape Water Supply System (WCWSS) the national Department of Water and Sanitation (DWS) leads efforts, with the voice of municipal or local stakeholders (including, for example, agricultural boards) not always adequately factored into decision-making. Increased capacity for DWS and ensuring greater influence from other agencies would help improve the quality and responsiveness of decision-making, especially during times of crisis. Reliable and shared datasets are an area of particular concern; a neutral party may be required to manage data sharing. The City has started looking outwards and working with other water users and municipalities since the drought, and there is a need to maintain and built upon these improvements.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

› QUALITATIVE INDICATOR (B):

*Coordination exists within government agencies to define and implement water priorities.*

A growing consensus exists within the City government across departments on water-related matters, and water management has emerged as a strategic priority for Council (not just the City Department of Water and Sanitation). The drought helped break down silos that previously existed. The Water Resilience Task Team, a transversal team, was instrumental in coordinating the drought response. The city-wide Water Strategy, approved by Council in May 2019, acknowledges that water management is more than just the role of the City utility. Improvements have been made since the drought, but serious challenges remain, and efforts to improve coordination between City departments since 2018 should be maintained post-crisis, with attention paid to monitoring these relationships and keeping momentum.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

### 3.3 Proactive coordination between government, private sector and civil society

› QUALITATIVE INDICATOR:

*Frameworks and mechanisms promote dialogue and deliberation around water and resilience issues between government and non-government actors.*

Participants at the Assessment Workshops were predominantly of the view that prior to the drought crisis, the City government mainly viewed citizens as consumers rather than as stakeholders to collaborate with. More recently, businesses and residents are increasingly being recognised as important partners in managing water shocks and stresses, and the City has improved collaboration with non-government actors. The City has a good sense of which stakeholders are responsible for water-related work across the city. However, further improvement is needed to align government and non-government actors in strategy implementation and engagement should be sustained. The City lacks a formalised approach, with coordination often performed on an ad-hoc basis. At times, it has been difficult for the City to identify stakeholders and stakeholder groups, particularly those people living in informal settlements. Defined rules around the type of coordination that occurs between different groups are needed. The Section 80 Water Resilience Advisory Committee, created during the height of the drought, is acknowledged as a best practice but needs to become even more collaborative.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

### 3.4 Proactive coordination with relevant upstream stakeholders

› QUALITATIVE INDICATOR:

*Frameworks and mechanisms promote coordination between city stakeholders and relevant upstream stakeholders on water issues.*

Recent efforts target improvements to water quality and stopping pollution. One example of this is the Berg River Improvement Plan, a successful collaboration between stakeholders to improve water quality in the Berg River. The City's support for the Greater Cape Town Water Fund (GCTWF), an initiative started by the Nature Conservancy, which includes business, civil society and government partners, is another good example of collaboration to deal with the removal of alien invasives, though it is relatively new and will need further support. On the whole, the City does better on informal collaboration than through formalized processes. Increased focus on relationship-building, and not simply on developing technical abilities, would lead to better coordination between stakeholders. For instance, the relationship between the City and government agencies managing protected areas is good at an operational level but poor at the strategic and political level. Alien species infestation must be addressed through collaboration with upstream stakeholders.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

### 3.5 Promotion of clear stakeholder roles and responsibilities

› QUALITATIVE INDICATOR:

*Frameworks and mechanisms clearly define the roles and responsibilities of water stakeholders.*

Laws and policies delineating the roles and responsibilities of water stakeholders exist, but there is poor accountability of actors working in the system. Few mechanisms exist to build accountability, transgressions are not adequately monitored and key problems exist around enforcement. There are differences in the clarity regarding roles and responsibilities for different water resources. For example, the roles around the management of surface water are well established and generally work well, while the roles around the management of groundwater are less clear, decreasing accountability for good management of the resource. National water laws may need to be amended to reflect the changing realities of water management in the urban environment. Funding questions are crucial in promoting clear stakeholder roles and responsibilities.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

# EFFECTIVE REGULATION & ACCOUNTABILITY

## 4.1 Effective implementation of transparent and accountable decision-making procedures

› QUALITATIVE INDICATOR:

*Decision-making procedures around water resource management, water and wastewater services are made clear and open to all stakeholders.*

Roles and responsibilities within City government are clear and well-defined, and accountability for decision-making has improved since the drought crisis. The City is not in control of decision-making around water resources that are located outside its area of municipal competence and therefore it has limited ability to leverage for improvement. The City encourages and enables citizens to participate in decision-making, and formal spaces for participation exist. However, while all stakeholders have the right to participate, the uptake of the opportunity is low and few people execute their rights. The City provides as much information as possible (particularly during the drought). Less clarity exists publicly around how the national Department of Water and Sanitation makes decisions, particularly on fund allocation and bulk water allocation, and limited information is made available to the public. For information that is made available by government—despite improved efforts from the City—there is often limited guidance on how to use data, and it can be difficult for non-experts to interpret this information.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

## 4.2 Enforcement of design guidelines and construction standards for water infrastructure

› QUALITATIVE INDICATOR:

*Technical standards and design guidelines define best practice for critical infrastructure.*

Technical standards and design guidelines for public infrastructure exist and are available to all relevant users. Generally, they reflect the latest industry standards, and in some cases are world-leading. However, standards and design guidelines for private water installations such as boreholes have not been sufficiently developed. There is room for improvement in the enforcement of standards regarding private water installations as inspectors often lack capacity and necessary resources. The City is constantly innovating and trying to encourage improvements in private water installations. City water by-laws are periodically updated to enable the installation of more efficient water technology in new property developments.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 2

## 4.3 Enforcement of land use regulations and zoning

› QUALITATIVE INDICATOR:

*A sound regulatory framework controls land use and urban expansion and reduces growth in high-exposure and water-poor areas.*

The City has developed a comprehensive framework, including the Municipal Spatial Development Framework, District Plans and Built Environment Performance Plans, to guide and control land use and urban expansion, and associated infrastructure provision. The legacy of Apartheid spatial planning has contributed to significant urban sprawl, and to some extent this sprawl has continued in the democratic era. There are now more concerted efforts to promote densification and to discourage development beyond the urban edge. There is a growing challenge of illegal land occupations and the development of new informal settlements, which poses significant challenges for the provision of water and sanitation services.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

### 4.4 Effective enforcement of economic regulations for water

› QUALITATIVE INDICATOR:

*Economic regulation of water and sanitation services and water resources is performed independently and effectively, resulting in adequate provision of key services, and high customer satisfaction.*

Municipal tariffs and charges for water and sanitation services and water resources exist, as approved annually by the City Council, but are not regulated by an independent entity as is done for electricity tariffs. In calculating its water tariffs, the City accounts for the costs of bulk water costs from the national government, the treatment of water to potable water, maintenance and expansion of the service, and equity considerations. City residents and businesses often do not understand efforts by the City government to balance affordability and cost recovery principles and do not understand the tariff scheme or how tariffs are set, which reduces their willingness to pay for water and contributes to low customer satisfaction. Wastewater tariffs are calculated as a percentage of the water tariff and do not reflect actual cost. Tariffs for bulk water are set by the national Department of Water and Sanitation.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 1

### 4.5 Effective enforcement of environmental regulations for water

› QUALITATIVE INDICATOR:

*Environmental regulation is performed independently and effectively, resulting in high quality, protected water environments.*

There is no independent regulator for enforcement of environmental regulations, although there are comprehensive environmental standards in place. The City mostly regulates itself in terms of the prescribed national norms and standards. All relevant spheres of government lack capacity and resources to fully effect environmental compliance. In recognition of the need to effectively manage and protect its environment the City has developed and is leading the implementation of the Integrated Metropolitan Environmental Policy (IMEP) which forms the framework for a series of strategies and programmes aimed at ensuring that the principles of environmental sustainability are adhered to. The City tries to address environmental risks associated with new water supplies.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

### 4.6 Effective enforcement of public health regulation for water

› QUALITATIVE INDICATOR:

*Public health regulations for water is performed independently and effectively, resulting in water that is safe to consume and wastewater that can be returned to the water cycle with minimal environmental impact*

Public health regulations particularly around drinking water quality are comprehensive, and the City puts significant effort into providing best quality water to all its residents. All water entering Cape Town's piped network and intended for drinking is treated to meet minimum national water quality standards. Compared to other municipalities in the country, the City performs relatively well on most measures of water quality. Regulation is lacking around water quality of alternative sources such as private boreholes—this is the responsibility of the national government which does not have sufficient capacity to monitor or regulate. There is no comprehensive inventory of alternative, decentralised systems including private and commercial boreholes, which would allow for regular monitoring of water quality at these outlets. There is no independent regulator of water quality, and the City regulates and monitors itself. The City monitors the quality of raw and treated water, allowing for suitable management actions to maintain consistently good quality standards in the water supplied to customers. However, the treated reuse of wastewater, desalination and aquifer abstraction, all of which in are in various stage of project execution for the purposes of augmenting water supply, pose new challenges to the maintenance of water quality and public confidence, and the City will need to improve its capabilities in this regard.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 3

# 5 ADAPTIVE & INTEGRATED PLANNING

## 5.1 Active monitoring and evaluation of programmes

› QUALITATIVE INDICATOR:

*Monitoring and evaluation mechanisms and frameworks measure how programmes have achieved intended outcomes and disseminate lessons learned.*

Monitoring and evaluation of City government projects and programmes is conducted by various entities including Council portfolio committees, the provincial government, the national Department of Water and Sanitation and the Auditor-General. The City's Water Services Development Plan, which is publicly available, outlines performance and new projects. Statistics South Africa runs household surveys, the City government as whole runs customer satisfaction surveys and the City's Water Department runs customer surveys to obtain important data to improve business processes and service delivery. The national Department of Water and Sanitation has previously championed the Blue Drop and Green Drop reporting system across the country, including Cape Town, to monitor and improve the performance of water treatment and wastewater treatment operations, although in recent times implementation of these programmes has been haphazard. There is room for improvement in reflective learning and dissemination of lessons, although Cape Town has a large number of water professionals across government, business, academia and civil society who are highly active in various learning platforms.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

## 5.2 Incorporation of redundancy into water sources, networks and assets

› QUALITATIVE INDICATOR (A):

*Redundancy exists in the networks and assets responsible for water supply, treatment and sanitation.*

The drought was an extreme natural event and yet Cape Town was able to survive under significant stress, which speaks to generally good redundancy of infrastructure. However, water infrastructure performed much better than wastewater or sanitation infrastructure, which requires additional attention and investment. One particular weakness lies in the tunnels that supply bulk water to Cape Town. Long-term planning for water supply has identified new strategies that mitigate this risk. Still, the vulnerability of the bulk system needs to be taken seriously as the combination of water supply and another drought could be devastating. Smaller scale infrastructure, for instance at the household level (rain tanks, etc.) may help improve redundancy.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

› QUALITATIVE INDICATOR (B):

*Redundancy exists in the sources that supply water to the city.*

Generally, there is redundancy of water sources. Bulk water sources are strong, as proven during the drought, which required extreme demand management, but which Cape Town was able to manage successfully. However, better coordination is required around planning for groundwater resources. Cape Town should move towards a fully integrated "closed loop" approach that makes better use of existing wastewater resources, i.e. resources "under city control".

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 1

### 5.3 Integrated planning across interdependent urban system

› QUALITATIVE INDICATOR:

*Coordination exists between public sector water agencies, water utilities and organisations working in related domains such as energy, telecommunications, waste management and transportation.*

There is room for improved planning with other interdependent systems, including housing, urban planning, transportation and solid waste management (SWM). Better coordination is required to meet the needs of "backyarders" and residents living in informal settlements. Stronger formal or institutionalized relationships are required to ensure better coordination at the City level. The Built Environment Performance Plan, the District Plans and the growing maturity of the Project Portfolio Management system all offer good bases off of which to leverage improvements. The next iteration of sector plans will benefit from analysis across portfolios of projects to search for commonalities, gaps and potential dividends in infrastructure plans that seek to address prioritised shocks and stresses.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

### 5.4 Integrated planning with agriculture and food supply chains

› QUALITATIVE INDICATOR:

*Coordination exists between water agencies and organizations involved in food supply and production.*

The drought crisis prompted conversations between the City government and food producers which had not been happening previously on regular occasions. There is generally limited coordination between City and private sector stakeholders involved in food supply, including agriculture and retailers. There is also limited data available on water requirements for food and consumption by food-related industries, and this data, where it does exist, is not sufficiently disseminated. Conversations around food, including its availability and affordability, mostly happen between and academia and community organisations. It would be beneficial for all spheres of government to play active roles in these conversations. City-wide planning is needed to address urban agriculture needs, including what approaches are most efficient based on space needs. A systematic approach does not currently exist.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

### 5.5 Promotion of culture, processes and resources to enable innovation

› QUALITATIVE INDICATOR:

*Resources and processes reinforce a culture of innovation within the water section.*

Cape Town is breaking ground on the use of new technologies, including desalination and direct re-use, and generally good relationships exist between the public sector, universities, and private sector. A notable example of capacity building between government and the private sector is the direct training of plumbers to improve water efficiency and conservation in households. However, much of this innovation is not institutionalized or supported by incentives but instead happens out of necessity (rather than by design). Efforts to incentivise innovation, to improve training of public sector employees (particularly officials working on supply chain management processes) and to improve water efficiency standards driven from a national level, are all required to boost innovation even further.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

### 5.6 Dissemination of accurate data

› QUALITATIVE INDICATOR:

*Accurate data is used by key decision-makers in government, private sector and civil society to promote urban water resilience.*

Limited data was made available at the start of the drought crisis, but City government made significant efforts to improve both the availability and accuracy of data provided to households and businesses. Moving forward, focus should be paid to communicating and disseminating information widely, in a sustained and usable manner. Some agencies are better than others at sharing available data on a regular basis (e.g. data around bulk-water is made available regularly). Currently, data remains siloed and is not easily accessible by stakeholder groups. The City's open data portal has, however, improved the dissemination of the City's water-related data and the City's publicly accessible map viewer is a powerful resource for civil society groups and private sector developers. Implementation of the City's new Data Strategy is trying to address the coordination and leveraging of data for decision-making, with a strong emphasis on partnerships with academia and civil society. Highly technical data—for example, related to hydrological modelling—are specialized enough that they are effectively "black boxes" i.e. interpretable only by a very limited audience; greater transparency may be needed to ensure trust and redundancy in interpreting this information. Better transparency about where data is coming from will improve faith in data products. More information is required for boreholes and groundwater information.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2


# SUSTAINABLE FUNDING & FINANCE

## 6.1 Promotion of integrity in contracting and financial decision-making procedures

› QUALITATIVE INDICATOR:

*Financial procedures promote transparency, minimize risk and ensure that procurement processes are implemented fairly and efficiently..*

There is good transparency and a perception of fairness in contracting and financial decision-making procedures including around procurement. However, a trade-off exists between the need to make these procedures corruption-proof and making them efficient. Because contracting and financing decisions are subject to rigorous legislation to ensure transparency, this process can take a long time, specifically as it relates to procurement. It is notable that during the drought crisis, when projects were being implemented at a rapid pace, no queries were raised by the Auditor-General in the audit report. Internal City procedures with regards to project preparedness before procurement are highly rigorous and designed to ensure that capital budgets are spent on time. Management of contracts is another important focus area to ensure that contracts are implemented as intended after they have been awarded.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 2

## 6.2 Provision of sufficient financial resources for maintenance of water infrastructure

› QUALITATIVE INDICATOR:

*Adequate funding exists to maintain existing water infrastructure and to support ongoing programmes.*

While the City may have a limited budget for maintaining infrastructure, money is generally disbursed effectively. There is no clear overview on financing gaps or maintenance shortfalls. However, the City does not spend enough to maintain its water supply, sanitation and stormwater infrastructure at appropriate levels. On the bulk supply side, the national government does not provide enough funds to maintain its infrastructure, mainly because it is confronting its own financial challenges. As a result, the national Department of Water and Sanitation (DWS) is not allocating funds for maintenance or to other organisations to take on the responsibility. To keep tariffs affordable and to not create deficits, maintenance costs are reduced, which usually impacts particularly preventative maintenance, which is cost-intensive.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

## 6.3 Provision of sufficient financial resources for new water programmes and projects

› QUALITATIVE INDICATOR:

*Adequate funding exists to finance new capital projects and programmes that support water resilience.*

The City has good access to capital, including through loan financing, grant funding and tariff revenue, to develop new water programmes and projects. The majority of the capital portfolio relates to bulk, treatment and reticulation services and infrastructure, and there is a need for more allocations for the further development of stormwater infrastructure and blue-green infrastructure. This is important to ensure that mitigating flood shock events receives the same attention that mitigating drought shock events has received in recent years. There is insufficient funding available for catchment management, which requires funding sources from multiple spheres of government and private sector stakeholders.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

## 6.4 Water and sanitation pricing for cost recovery and demand management

› QUALITATIVE INDICATOR:

*Water tariffs are sustainable and equitable.*

The City has learned from the experience of other cities to improve its tariff system and ensure economic equity across the whole city. Although the urban poor receive water for free, middle class households often indicate that water is too expensive. Cost recovery is a problem, particularly considering the existing investment pipeline for the augmentation schemes. Infrastructure planning is not reflected in the tariff (full cost recovery) and it is not clear how much of the cost of planned investments can be covered through the tariff. Most customers are metered and pay according to consumption, and a rising block tariff encourages people to consume less, though people using private boreholes do not pay for the water they abstract. Both collection efficiency and willingness to pay are low. Revenue streams from national government to ensure affordable water to poor households is not always reliable. No clear tariff principles have been defined and the tariff is not easy to explain. While the City implemented a communication campaign during the drought to explain the tariff rises, there is still limited understanding of the tariff. Communicating on the water tariffs and how they are developed still needs improvement.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2


# EFFECTIVE DISASTER RESPONSE & RECOVERY

## 7.1 Comprehensive hazard monitoring, forecasting and early warning systems

› QUALITATIVE INDICATOR:

*Monitoring, modelling and early warning systems mitigate hazard risks.*

Better data and data management will help improve monitoring, forecasting and early warning. Hazard monitoring, forecasting and early warning systems exist but better access to data is needed to inform monitoring and models. Some notable improvements have been made recently. For example, the South African Weather Service's impact-based forecasting to institutions helps translate probability and impact to institutional stakeholders. The City, public broadcasters and insurance companies release warnings to citizens, across multiple media platforms, when the need arises.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

## 7.2 Coordination of disaster response and recovery preparation

› QUALITATIVE INDICATOR:

*Disaster response and recovery coordination plans and procedures are current, collaborative, well-rehearsed and properly funded.*

In part due to the drought crisis, the City does a good job of ensuring regular coordination and meetings between various stakeholders working in disaster response. There are a range of up-to-date hazard plans, including for flooding and critical water shortages. However, information and experience often does not translate back into learning to inform improvements in plans. Risk readiness should be included into all plans and not just for emergencies. There is room for business continuity improvements in all spheres of government and in the private sector. The drought crisis shone a light on this, but it needs to be a behaviour that is embraced for a range of shock events.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

## 7.3 Ensuring adequate funds to government for disaster recovery

› QUALITATIVE INDICATOR:

*Public Authorities have access to funds for disaster recovery.*

Financial resources for disaster recovery is a challenge for the City government. There are not enough public resources available and limited national-level disaster funds exist in case of an emergency. An additional problem is that disbursement of funds for disaster recovery is slow. The Municipal Finance Management Act is highly restrictive with regards to emergency changes that can be made by Council under emergency circumstances. The City should advocate to National Treasury for changes, particularly in light of the likely increase in intensity and frequency of extreme weather events. The City should consider working with other metropolitan municipalities to explore innovative insurance products for critical infrastructure damaged during shock events.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

### 7.4 Promotion of community capacity for preparedness and response to water hazards

› QUALITATIVE INDICATOR:

*Mechanisms promote community preparedness and community-based early warning systems and response to water-related shocks and stresses.*

Good early warning systems exist, and concerted efforts are in place to identify key stakeholders. Much improvement in information-sharing for early warning has happened since the drought crisis, although it is not clear whether behaviours will be sustained post-crisis. Still, information is not always uniformly disseminated to residents. In informal settlements, safety concerns for government officials and, at times, a lack of clear leadership can present challenges to government efforts at promoting community preparedness. On the other hand, in middle-income neighbourhoods, residents may be isolated from their neighbours, which can detract from community preparedness for shocks and stresses. A lack of dissemination and a need for improved engagement also means that locals do not generally engage with preparedness and community-based early warning systems. Low-tech, informal or social media-based communication—for example, through WhatsApp and Facebook— is increasingly common, but is still mainly used for coordinated anti-crime efforts, and less though for disaster preparedness. Winter readiness programmes exist for the period of the year most at risk of increased flooding, but these programmes need increased funding to reach a greater number of communities at risk.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

### 7.5 Ensuring adequate financial resources for recovery of households and businesses

› QUALITATIVE INDICATOR:

*Households and businesses have access to sufficient financial resources for recovery and continuity following shock events or persistent stresses.*

Currently, residents in poorer and more vulnerable areas, such as informal settlements and backyard dwellings, are unlikely to have access to sufficient financial resources and insurance products to aid in recovery. After a flood or other shock event those affected may be given access to emergency shelter, blankets, and materials to rebuild homes, but these resources are limited to short-term disaster-based support and not always made available quickly. Residents in middle-income neighbourhoods are better placed to draw on personal savings, insurance products or sell assets to aid in recovery. With increasing costs of living, more people are dropping their insurance premiums, and there may be only a small proportion of Capetonians who have savings or pensions sufficient for retirement. Business continuity plans are generally lacking across the city, in both businesses and households.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3


# PROTECTED NATURAL ENVIRONMENTS

## 8.1 Active monitoring and evaluation of water infrastructure

› QUALITATIVE INDICATOR:

*Active monitoring and evaluation of water infrastructure and networks ensures data is current and accurate.*

The whole water system (both catchment and urban environment) is well mapped, with the exception of infrastructure in informal settlements. Although data that is available is generally considered accurate when derived from government partners, some actors working in the water system have significantly better data / data management than others, highlighting how the water system is still managed in silos. The quality of active monitoring and evaluation of infrastructure varies significantly between components of the system and by geographic area. For example, more is known about the bulk and reticulation systems than waste water management system. Improved monitoring and evaluation of infrastructure and service delivery is needed in informal settlements.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

## 8.2 Ensuring adequate human capacity for operations and implementation

› QUALITATIVE INDICATOR:

*Technical and managerial staff are trained and knowledgeable in areas related to operation of key infrastructure and project implementation.*

Human resource strategies are in place, including succession planning and workforce skills development. Each branch of the City's Department of Water and Sanitation has its own staffing strategy. The City has a good understanding of what skills are needed and has developed plans to retain skilled staff, and teams charged with managing the water system during the drought were generally well-trained and efficient. Human resources need to align with available technology for process optimisation. Employee needs and wellbeing must also be considered to optimise performance. There are gaps around skills in the city for new augmentation technologies, such as desalination. While this can be secured through contracted professional services from the private sector it is important that the City retains some of its own skills in these technologies. It is not understood what the implications for staff and staff structures are related to the new Water Strategy. There needs to be some new skills / upskilling and capacity building within the city to implement the strategy. Transversal integration of skills for water-related projects from across City departments does not happen sufficiently, although during the drought crisis this did improve. There is general concern about whether the required skills of the "fourth industrial revolution" is fully appreciated and how new technological developments (e.g. blockchain) might disrupt existing models.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 2

## 8.3 Promotion of diverse infrastructure for flood protection

› QUALITATIVE INDICATOR:

*'Grey' and 'green' infrastructure provide protection from flooding and ensure adequate urban drainage.*

Cape Town's green assets are not sufficiently valued, and there is insufficient appreciation for the totality of the green asset base. The business case for enhancing or creating green infrastructure is not routinely considered as a choice during decision-making. In designing new projects, green infrastructure is often considered as an "add-on" and not a central feature. The advancement of green infrastructure is frequently pitted against land use for development or other purposes; land, particularly in urban integration zones, is prioritised to create opportunities for affordable housing. Water-sensitive design should be about creating more equitable cities, not just about improving the natural environment. Strategies need to be

bolder and promote integrated green and grey infrastructure that work in synergy, not as opposition. Related benefits from flood protection in the form of improved liveability, connectivity, productivity, enhanced property value, and transport value are often overlooked. Intensive lobbying and more research and development is needed.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

### 8.4 Routine maintenance and upgrade of water infrastructure

› QUALITATIVE INDICATOR:

*Existing infrastructure is regularly maintained and upgraded to reduce likelihood of failure.*

Infrastructure in Cape Town is generally of a high standard. Maintenance budgets exist, and the City makes a significant effort to ensure infrastructure is maintained. There may be some revenue challenges (as more customers go off-grid or conserve water consumption) which could affect future maintenance budgets. Additionally, more funding is needed for stormwater infrastructure maintenance, which has not increased in pace with inflation or consideration of the city's growth. Often, there is a bias towards reactive maintenance of infrastructure and more could be done to advance tactical maintenance. Routine maintenance of infrastructure in informal settlements is less successful than in formal areas. The City often takes a retrofit approach to infrastructure upgrades, but could explore upgrading as they are needed, which may be a more economically sensible approach.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 1


# EQUITABLE PROVISION OF ESSENTIAL SERVICES

## 9.1 Active monitoring and evaluation of environmental resources

› QUALITATIVE INDICATOR:

*Environmental monitoring is conducted to assess the health of water resources*

Monitoring and evaluation (M&E) takes place at a wide scale, but more resources are needed for monitoring of environmental resources and wastewater. Strategic water areas outside of the City's jurisdiction are not sufficiently monitored (although they are well-mapped). Monitoring practices should be reviewed to understand if they are as timely as needed, and what plans for interventions are in place if standards are not met. Better data and information sharing are required around environmental monitoring, and more clarity needed around how data is used. Guidelines exist, but there is a distinction between standards that strictly regulate drinking water quality (generally good) and guidelines around wastewater, and ecosystem quality, which are less prescriptive and/or enforceable. Specific attention should be paid to environmental services, river health, groundwater monitoring, ecosystems, etc. which do not receive as much attention as drinking water. Standards for drinking water are world class and when problems related to water quality monitoring are identified, rapid response can be expected, however, response is less effective in waste water quality monitoring.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 2

## 9.2 Promotion of sustainable commercial and industrial water use

› QUALITATIVE INDICATOR:

*Mechanisms encourage sustainable water use for commercial and industrial water users*

The drought crisis encouraged improved sustainable use, although it is acknowledged that commercial and industrial water user sectors are not significant in Cape Town and there are relatively few large water users in the city. Tools and mechanisms to enable improved efficiencies are not widespread and South African Bureau of Standards (SABS) standards are not sufficiently ambitious. The City's Star Rating system for businesses is good at promoting water improvements in large businesses, but it is not sufficiently scaled. The drivers of improved behaviour are often foreign owners and shareholders who demand that the standards of other countries are met. GreenCape and Wesgro performed especially well during the crisis, in part because they are not constrained like government sometimes is, and can therefore pursue innovation with water users. The crisis was a catalyst for sustainable use but the City needs to continue promoting sustainable use through communications and incentives.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 1

## 9.3 Promotion of sustainable household water use

› QUALITATIVE INDICATOR:

*Mechanisms encourage sustainable water use for households*

As a direct result of the drought crisis, Cape Town is exceedingly successful at managing water consumption. Communication campaigns and the response of residents and businesses contributed to this success. A significant shift in attitude occurred that includes new attitudes including that water is not free, higher usage should cost more, and a general realization of the costs of water. The water-use communications and GreenDot map should be continued even after the risk of 'Day Zero' has been reduced. However, "sustainable" water use also suggests the need for reuse of water through grey-water, water recycling, etc. and incentives can encourage this behaviour. In this regard, Cape Town is not as successful.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 1

### 9.4 Protection of aquatic habitats and ecosystems

› QUALITATIVE INDICATOR:

*Policies and programmes protect aquatic habitats and ecosystems*

Significant work is needed to improve management of aquatic habitats and ecosystems. Policies exist to protect aquatic habitats and ecosystems but these have not translated into effective programmes. Measures to improve aquatic habitats do not always account for or mitigate the effects of human activity on the environment, and the impact of urban development on aquatic ecosystems are not adequately considered. Here too, a lack of research and support for research frustrates better planning. Improved data sharing, and communication of key information is needed in the form of dashboards and other information sharing between City agencies, and two-way sharing between government and researchers.

QUALITATIVE SCORE: 1 | CONSENSUS SCORE: 2

### 9.5 Protection of groundwater and surface water resources

› QUALITATIVE INDICATOR:

*Protections exist to prevent over abstraction and reduce or eliminate pollution of surface and groundwater resources*

Policies to protect groundwater and surface water resources are not adequately enforced. Laws around groundwater abstraction are outdated and there is little information about how much water from private boreholes and wellpoints is being abstracted. The City should focus on fit-for-purpose water use, by which different water types and quality is directed to the most appropriate use (different levels of water quality are required for drinking, washing, irrigation, commercial and other uses). At times there is a lack of clarity around the laws that govern pollution i.e. what substances can be disposed of and how. Increased communication campaigns directed at households, businesses and industry may help users reduce pollution and dispose of waste in the most appropriate manner.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3


# HEALTHY URBAN SPACES

## 10.1 Provision of health services to reduce trauma from water hazards

› QUALITATIVE INDICATOR:

*High quality health services are made available to residents to reduce impacts from water-related shocks and stresses, including water-borne diseases*

High quality public health services are made available to residents through a comprehensive network of clinics and regional hospitals. This is augmented by private health facilities mainly accessed by residents with private medical aids. While comprehensive plans exist to provide health services to affected populations during a disaster, it is not clear to what extent provision would be timely and efficient as plans are not regularly tested, and implementation capacity may be limited. Disease outbreaks due to poor sanitation are of particular concern in informal settlements, and regular campaigns are conducted by the City to reduce the risk of outbreaks.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3

## 10.2 Provision of safe water for personal and domestic use

› QUALITATIVE INDICATOR:

*All people have access to sufficient, safe and accessible water for personal and domestic use*

The quality of water provided by the public supply network meets national standards and is considered consistently good throughout Cape Town. The City government is committed to provide basic services including a basic amount of water for free for those not able to afford this. The City tries to ensure an adequate supply of water at the right quality to meet the needs of all users. The water tariff structure (i.e. rising block tariffs) helps ensure that water is affordable and available for use, while waste is discouraged. Although residents in informal settlements receive water for free and infrastructure to provide services exist, accessibility is often difficult, made more complicated by security risks. There is room for improvement in service provision and minimum service levels in informal settlements. Due to fast growing informal settlements, infrastructure development and service provision lags.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 1

## 10.3 Provision of sanitation services

› QUALITATIVE INDICATOR:

*All people have access to sanitation that is safe, hygienic, secure, and socially and culturally acceptable*

Subsidies are used to keep sanitation services for basic needs affordable for poor households. However, operation and maintenance of the infrastructure remains a challenge. While minimum standards are defined and met, there is room for improvement to meet user needs. A significant number of people use pit latrines in areas with a high-water table, which poses a risk to public health. In general, sanitation services vary widely across the city and there is a huge gap in service quality between formal and informal settlements.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 1

## 10.4 Universal affordability of water and sanitation services

› QUALITATIVE INDICATOR (A):

*High quality water for consumption is made affordable to all users.*

Drinking water in Cape Town is relatively affordable by international standards. Subsidies are used to keep the water and sanitation services for basic needs affordable for poor households: poor households receive subsidies and the City provides water for free for those who cannot afford to pay for it (about 1.5 million people, or more than a third of the total population in the city). Affordability is generally not a concern for households living in informal settlements, though minimum service levels are. Affordability may also be growing a problem for middle-income households due to rising tariffs in an economic environment where households have decreasing disposable income.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 2

› QUALITATIVE INDICATOR (B):

*Safely managed sanitation services are made affordable to all users*

The City provides sanitation services to everybody, though the quality of services varies: households in informal settlements do not have access to individual facilities but share facilities between several households. While services are provided for free in informal settlements, it is difficult to assess the affordability of sewer charges. Households connected to the sewer network could pay more for the services they receive and contributions for wastewater disposal could be greater, as the City needs to invest more in the maintenance and expansion of the wastewater network.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 3


# PROSPEROUS COMMUNITIES

## 11.1 Application of water sensitive design principles to buildings

› QUALITATIVE INDICATOR:

*Design principles are promoted to improve water performance for buildings.*

Design guidelines have been developed for new buildings to improve water performance, but guidelines are needed around retrofitting existing buildings. For example, the City has no approach to improving the water footprint of existing government buildings. In general, the City could provide more guidance on reducing the water footprint for buildings, including through guidance and incentives to homeowners. Currently there are no financing mechanisms, including dedicated loans from the banking industry available for homeowners to access money to improve the water footprint of their property. Generally, past (and ongoing) sensitisation and education campaigns to change behaviours and encourage water conservation have only been partly successful. For example, the drought encouraged people to save water, but long-term behaviour change has not yet been achieved.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

## 11.2 Promotion of water-sensitive urban land development

› QUALITATIVE INDICATOR:

*Water is incorporated as a key consideration in land development.*

Neither water nor green or natural infrastructure is sufficiently incorporated into land development within Cape Town. While there are a limited number of efforts, the City does not actively promote projects that incorporate water as an element of land use planning and development. There are few or no regulations or incentives provided to real estate or the private sector to encourage blue designs including sustainable water use and water landscapes as key features, amenity or attraction in new developments. On the other hand, the new Cape Town Water Strategy highlights the City's vision to become a water-sensitive city and the role of water-sensitive urban planning in improving liveability more broadly through enhancing biodiversity and providing increased public green space, healthy urban waterways, and connected communities.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

## 11.3 Introduction and enhancement of neighbourhood blue-green infrastructure

› QUALITATIVE INDICATOR:

*Blue and green infrastructure is adopted in neighbourhoods.*

The City does not actively promote the use of blue and green infrastructure at a neighbourhood level or view it as a viable solution for solving urban and climatic challenges (e.g. storm water management, climate adaptation, or reduction of heat stress). One reason is that it is not clear whose responsibility it would be to operate and maintain blue-green infrastructure. Although people are aware that they need to address declining biodiversity, polluted water bodies and soils, the benefits of natural infrastructure are not widely understood and many rivers, streams and ponds in the city are in a very poor condition. Green infrastructure is more visibly promoted by non-government institutions, including community-based organisations (CBOs), civil society, etc. working in the built environment, and actions are largely done individually or at the neighbourhood level. There is no city-wide blue-green infrastructure plan, although a green infrastructure plan is currently being developed. However, some policies guide private sector action, for instance by-laws and policies around storm water. These are evaluated when plans are proposed but not over the course of the life of the project. Capacity building is required for building/planning enforcement agencies.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 2

## 11.4 Introduction and enhancement of water-sensitive urban design

› QUALITATIVE INDICATOR:

*Water is incorporated as a design element in urban place-making.*

Good examples of water-sensitive urban design exist, including Green Point Park, Bayden Park and the V&A Waterfront. However, these places are not necessarily accessible to all Capetonians and the practice of including water into urban place-making is not widespread. There are a number of water focused public amenities including public swimming pools and spray parks, of which the latter type of amenity is regarded as innovative on a global scale. Cape Town is ranked second in the world after Sydney for the number of tidal pools and significant effort is placed into maintaining and enhancing the status of the city's numerous Blue Flag beaches. Along the Lisbeek River, some investment has been put into de-canalising parts of the river and building new cycle paths. Drought-tolerant plants are increasingly being planted by the City Parks and Recreation Department in public spaces.

QUALITATIVE SCORE: 3 | CONSENSUS SCORE: 3


# PROSPEROUS COMMUNITIES

## 12.1 Provision of sufficient water quality and quantity for industry and commerce

› QUALITATIVE INDICATOR:

*Businesses and industry have access to sufficient water of appropriate quality.*

Cape Town provides sufficient water to business and industry, and customer satisfaction is generally high. Prior to the drought crisis, water pressure was at 6 bars, but was then reduced to 1-2 bars as a means to conserve water. Nevertheless, businesses were able to adapt to the lower pressure and higher tariffs. Some businesses augmented their water supply during the drought crisis with groundwater sources. Abuse or overconsumption by industrial or commercial users is not a significant concern. Tariffs make it cost imperative to reduce water consumption. In providing water for commercial and industrial purposes, it is important to provide water that is fit-for-purpose. For example, the Western Cape Government is undertaking a study now with the textiles and dyeing industry to explore the usage potential of lower quality water. At present, only a small proportion (~8-10%) of total wastewater treated is put back into the system to be used by businesses for recreation/tourism, coolant or refrigerant purposes.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 3

## 12.2 Support for improved mobility through water-based transportation

› QUALITATIVE INDICATOR:

*All communities have access to safe and reliable water-related transport where it is feasible to operate.*

The indicator is not applicable for Cape Town. The City investigated using ferries or boats given extensive access to the coastline, however feasibility studies have shown that frequent strong winds and changeable weather conditions would result in very high costs. Lack of integrated multi-model public transport between ferry terminals would also hinder good mobility. There is an opportunity to build infrastructure for non-motorised transport options along urban waterways, and there are a few examples of this already, but it will require the substantial improvement of the urban space around most waterways.

QUALITATIVE SCORE: NA | CONSENSUS SCORE: NA

## 12.3 Protections around climate-related displacement

› QUALITATIVE INDICATOR:

*Policies exist that protect vulnerable populations from displacement as a result of water-related shocks and stresses.*

By-laws and policies for protection are in place. In coastal areas, where there are risks from coastal flooding or inundation, there are coastal setback policies to move people back a certain distance. Still, enforcement is not strong enough. For example, displacement has been a challenge in the Khayelitsha wetlands over the last year, where significant development has occurred, and residents are illegally infilling sensitive wetlands. In another example from Hout Bay, people were temporarily relocated to a high flood risk area after fires broke out. A key question is: Where can the City relocate vulnerable groups? Often, relocation efforts are hampered by poor coordination and siloed working conditions within government. Historically the relocation process is not participatory and could benefit from more bottom-up community-driven policy making and community engagement.

QUALITATIVE SCORE: 2 | CONSENSUS SCORE: 3

### 12.4 Support for livelihoods around water

› QUALITATIVE INDICATOR:

*Jobs and skills are developed, and new opportunities created for developing livelihoods around water.*

Several programmes support job-development around water-related livelihoods. Large expanded public works programmes from all spheres of government working in the city and the broader catchment, train and provide work opportunities for poor residents. These include programmes such as Working for Wetlands and Working for Fires. The City's Green Jobs unit creates a large number of job opportunities for residents to manage 20 urban catchments and 16 rivers. All four of the regional universities offer a wide-range of academic and professional degree qualifications related to the broad water sector. Similarly, numerous Further Education and Training Colleges and a large number of private colleges offer opportunities for Capetonians to learn a range of engineering and artisan skills. The City government runs both artisan and graduate internship programmes to increase the pipeline of skills. GreenCape runs inspiration programmes to attract school leavers into the green economy space, including water-related fields. While there are lots of initiatives, it is unclear how well coordinated multiple programmes are and if a baseline assessment has been performed to identify what jobs are dependent on water.

QUALITATIVE SCORE: 4 | CONSENSUS SCORE: 3

# APPENDIX B:
# QUANTITATIVE INDICATORS SCORING THRESHOLDS

*This appendix provides thresholds for all quantitative indicators for which a 1-5 score has been assigned. Ranges are based on best available data from global datasets and literature.*

| 1 = Poor | 2 = Low | 3 = Fair | 4 = Good | 5 = Optimal |
|---|---|---|---|---|

**Indicator 5.3.a - Percentage of city population with regular solid waste collection**

**SCORING THRESHOLD:**

| (1) <40% | (2) 40-60% | (3) 60-80% | (4) 80-95% | (5)- 95-100% |
|---|---|---|---|---|

**Source:** Kaza, Silpa; Yao, Lisa C.; Bhada-Tata, Perinaz; Van Woerden, Frank. What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050. Urban Development;. Washington, DC: World Bank, 2018.

**Indicator 6.2.a - Billing efficiency: Total number billed for water or sewerage / total number of known water and sewerage connections required to pay charge**

**SCORING THRESHOLD:**

| (1) <85% | (2) 85-90% | (3) 90-92% | (4) 93-95% | (5) 95-100% |
|---|---|---|---|---|

**Source:** Andrews, Charles T., and Cesar E. Yñiguez. Water in Asian cities: utilities performance and civil society views. No. 10. Asian Development Bank, 2004.
Komives, Kristin, Vivien Foster, Jonathan Halpern, and Quentin Wodon. Water, electricity, and the poor: Who benefits from utility subsidies? The World Bank, 2005.
The Price of Water: Trends in OECD Countries, OECD Publishing, Paris. OECD, 1999.

**Indicator 6.2.b - Percentage of non-residential metered connections: Customer meters / service connections**

**SCORING THRESHOLD:**

| (1) <40% | (2) 40-70% | (3) 70-90% | (4) 90-98% | (5) 98-100% |
|---|---|---|---|---|

**Source:** Andrews, Charles T., and Cesar E. Yñiguez. Water in Asian cities: utilities performance and civil society views. No. 10. Asian Development Bank, 2004.

**Indicator 8.1.a - Non-revenue water by volume (%)**

**SCORING THRESHOLD:**

| (1) <50% | (2) 25-50% | (3) 10-25% | (4) 5-10% | (5) <5% |
|---|---|---|---|---|

**Source:** International Comparisons of Water Sector Performance. Global Water Intelligence, 2018.

**Indicator 9.4. - Percentage wastewater effluent treated in compliance with local quality standards**

**SCORING THRESHOLD:**

| (1) <40% | (2) 40-60% | (3) 60-80% | (4) 80-95% | (5) > 90% |
|---|---|---|---|---|

**Source:** Arup / 100 Resilient Cities

**Indicator 9.5. - Percentage of bodies of water with good ambient water quality**

**SCORING THRESHOLD:**

| 1 <40% | 2 40-50% | 3 50-75% | 4 75-90% | 5 > 90% |
|---|---|---|---|---|

**Source:** Progress on Ambient Water Quality: Piloting the monitoring methodology and initial findings for SDG indicator 6.3.2. UN-Environment, 2018

**Indicator 10.1a. -Under age five mortality per 1,000 live births**

**SCORING THRESHOLD:**

| (1) >100 | (2) 50-100 | (3) 15-50 | (4) 5-15 | (5) <5 |
|---|---|---|---|---|

**Source:** Human Development Indices and Indicators 2018, Statistical Update, UNDP, 2018.

**Indicator 10.1b. -Number of physicians per 100,000 population**

SCORING THRESHOLD:

| (1) <20 | (2) 20-50 | (3) 50-100 | (4) 100-150 | (5) >150 |
|---|---|---|---|---|

**Source:** Source: Human Development Indices and Indicators 2018, Statistical Update, UNDP, 2018.

**Indicator 10.1c. -Number of mental health practitioners per 100,000 population**

SCORING THRESHOLD:

| (1) <1 | (2) 1-5 | (3) 5-10 | (4) 10-140 | (5) >40 |
|---|---|---|---|---|

**Source:** "Psychiatrists and nurses working in mental health sector (per 100 000 population), 2014-2016" World Health Organization, Global Health Observatory data repository. Accessed 15 August 2019.

**10.2b. -Percentage of population using safely managed drinking water services that is accessible on premises**

SCORING THRESHOLD:

| (1) <50% | (2) 50-70% | (3) 70-90% | (4) 90-95% | (5) >95% |
|---|---|---|---|---|

**Source:** Progress on household drinking water, sanitation and hygiene 2000-2017. Special Focus on Inequalities. New York: United Nations Children's Fund *UNICEF) and World Health Organization. 2019.

**10.2c. -Intermittent Water Supply (IWS): Population experiencing restrictions to water service**

SCORING THRESHOLD:

| (1) 50% | (2) 10-50% | (3) 5-10% | (4) 2-5% | (5) <2% |
|---|---|---|---|---|

**Source:** Jacobsen, Michael, Michael Webster, and Kalanithy Vairavamoorthy, eds. The future of water in African cities: Why waste water?. The World Bank, 2012.

**10.2e. Percentage of water quality compliant with local quality standards**

SCORING THRESHOLD:

| (1) <40% | (2) 40-60% | (3) 60-80% | 4 80-95% | (5) >95% |
|---|---|---|---|---|

**Source:** Arup / 100 Resilient Cities

**Indicator 10.3a: Percentage of the population with household sewer connections**

SCORING THRESHOLD:

| (1) <40% | (2) 40-60% | (3) 60-80% | (4) 80-95% | (5) >95% |
|---|---|---|---|---|

**Source:** Wastewater Report 2018: The Reuse Opportunity. International Water Association, 2018

**Indicator 10.3b - Percentage of population using safely managed sanitation services**

SCORING THRESHOLD:

| (1) <40% | (2) 40-60% | (3) 60-80% | (4) 80-95% | (5) >95% |
|---|---|---|---|---|

**Source:** Washdata.org. World Health Organization/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation. Accessed 15 August 2019.

**Indicator 10.3b - Green area per 100,000 population (hectares**

SCORING THRESHOLD:

| (1) <50 | (2) 50-100 | (3) 100-200 | (4) 200-500 | (5) >500 |
|---|---|---|---|---|

**Source:** Global Destination Sustainability Index 2018; Urban Green Spaces and Health: A Review of Evidence. World Health Organization, 2016.

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