

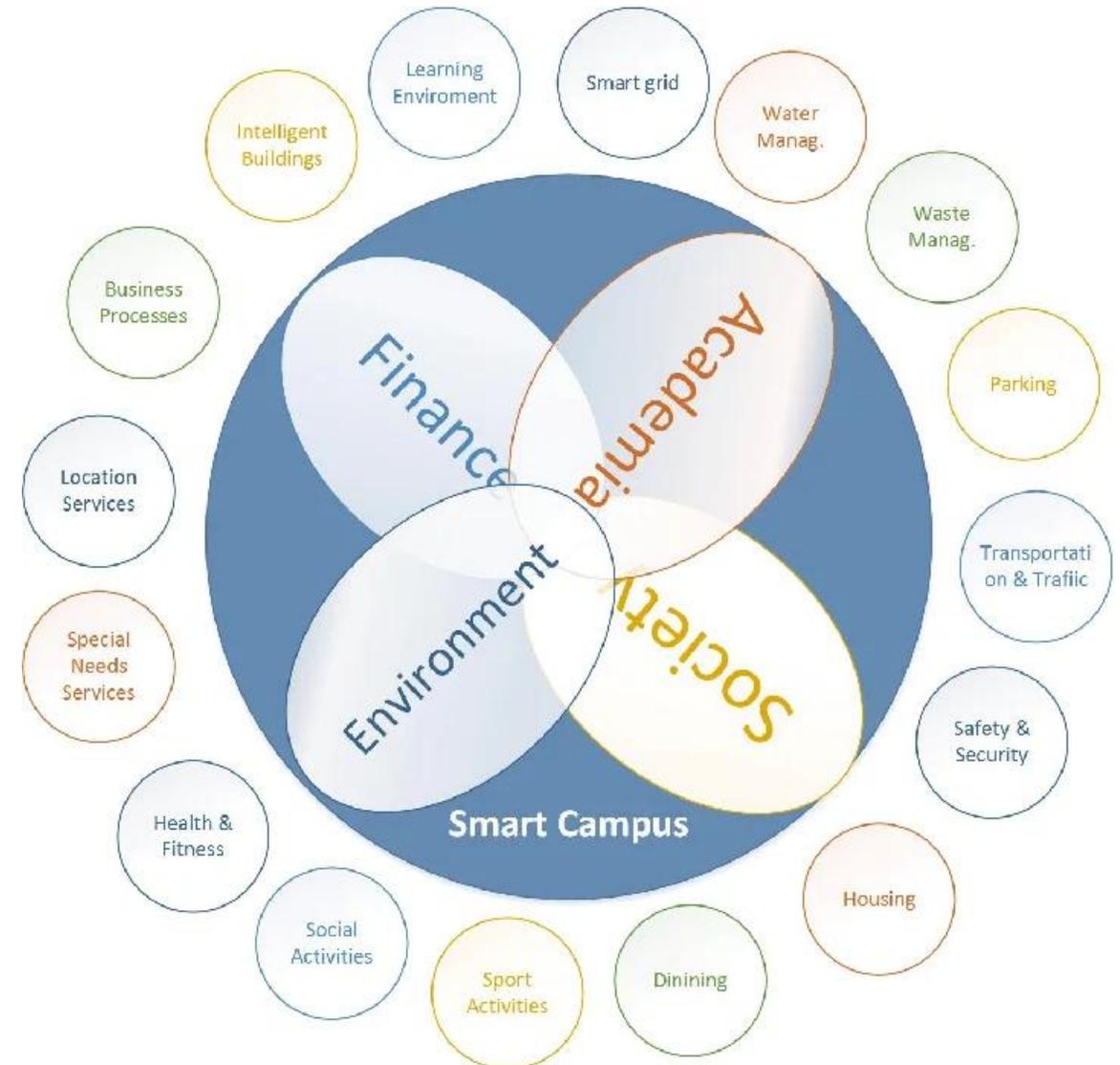
HEFMA Western Cape Chapter - COO Forum 23 - 24 March 2026

Systems Integration, Sustainability
Transformation &
Water Optimization Strategy



Introduction

- Legislation
- Town and Regional Planning
- FM Strategy - Change System
- Digitization Strategy and Concept
- Case Studies - Environmental impact
- Business Continuity - Resilience
- Q & A - engagement



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Water Infrastructure Challenges in South Africa

Key National Challenges

- Aging water infrastructure networks across major cities
- High levels of non-revenue water due to leaks and pipe failures
- Increasing urban population and demand for water services
- Infrastructure maintenance backlogs in municipalities
- Limited technical capacity to maintain complex infrastructure systems

Joburg disaster: Collapsing water infrastructure in pictures



Failing municipal infrastructure, not water scarcity, driving South Africa's water crisis

14 March 2026
by: Creamer Media Reporter

South Africa's escalating water outages are being driven primarily by failing infrastructure rather than water scarcity, and the country is facing a critical turning point requiring urgent engineering intervention to prevent further service delivery collapse.

Recent national assessments showed that about 47% of treated water was lost before reaching consumers – significantly higher than the global average of about 30% – largely owing to leaks, ageing pipelines, illegal connections and inadequate maintenance, said South African

DELIVERY MANAGEMENT FLAWS HAMSTRINGING GROWTH AND DEVELOPMENT IN SOUTH AFRICA

Eddie Rakabe¹ and Ramos Mabugu²

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ABSTRACT

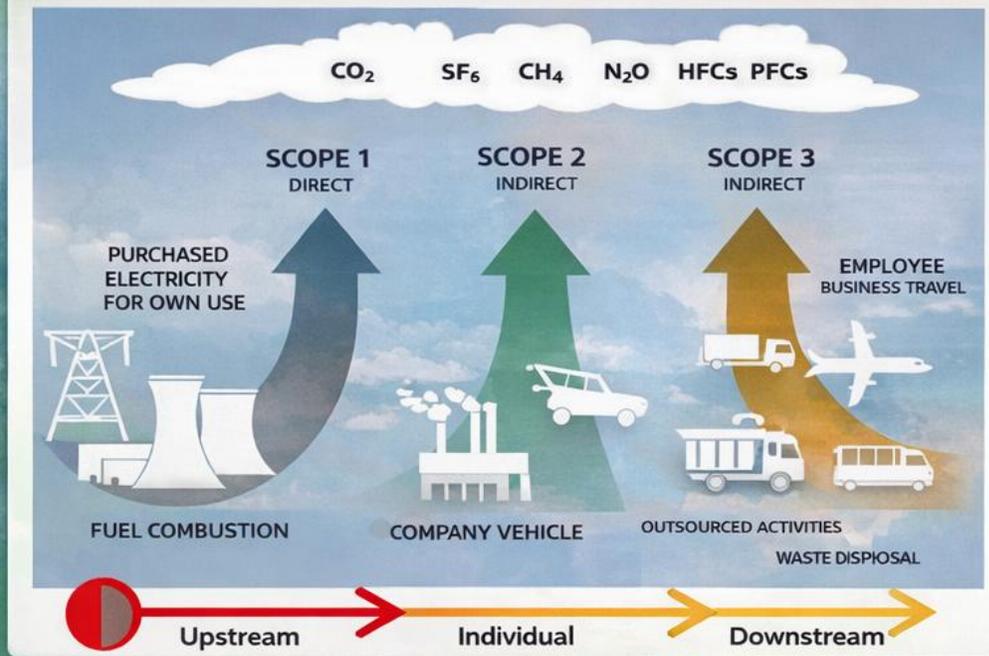
Planning, budgeting, coordinating, managing the lifetime of a project, evaluating it, being transparent and accountable, and adhering to rules on the public availability of infrastructure services are all part of infrastructure delivery management. However, there is a declining local government infrastructure budget in South Africa. Hence, this study evaluates local governments' management and infrastructure delivery chain to pinpoint the obstacles preventing the creation of an efficient, sustainable, and successful infrastructure delivery program through a review approach. The study's findings reveal the institutional and regulatory framework for infrastructure delivery, infrastructure delivery chain, municipal infrastructure delivery performance, and local government infrastructure delivery challenges, such as poorly managed consultations, weak multi-government coordination, political-administrative interface, and monitoring and evaluation. The study concludes that municipal infrastructure has no proper planning or life-cycle management. Therefore, the study recommends a stronger focus on peer learning across municipalities and the complete life-cycle management of municipal infrastructure rather than introducing new infrastructure. The secret to

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Environmental Sustainability impact: Water has a carbon footprint

SU Greenhouse Gas Emissions – Carbon Footprint

Breaking Down Carbon Emissions



Carbon Footprint at Stellenbosch University (SU)

SCOPE 1	SCOPE 2	SCOPE 3
± 682 tCO ₂ e	± 69 965 tCO ₂ e	± 49 954 tCO ₂ e
± 682 tCO ₂ e	69 965 tCO ₂ e	69 955 (a) 632 tCO ₂ e 9 933 tCO ₂ e
94 98 tCO ₂ e	-83.092 59 930 tCO ₂ e	Self-fulfilled Activities Metings 632 tCO ₂ e 9 933 tCO ₂ e
22 758 tCO ₂ e	2.009 TCTL 59 930 738 tCO ₂ e	Teatntrice Compring in Prociets 616 tCO ₂ e Factory Commissions Meurites +23 896 tCO ₂ e
TOTAL SCOPE 1 ± 682 tCO ₂ e	TOTAL SCOPE 2 ± 69 965 tCO ₂ e	TOTAL SCOPE 3 ± 49 954 tCO ₂ e

COMPANY METRICS

Full-time Employees	4,180
Students	31,753
Total Population	36,598

INTENSITY METRICS

CO ₂ e /FTE	± 12.0e (FCU) ± ± U(p) ose
CO ₂ e /FTE	± ± 3.6e (4±) ± ± Population



Key Insight: Includes direct, indirect, and value chain emissions. Highlighting multiple areas for sustainability initiatives.



OUTSIDE OF SCOPES

550 888 kl

Aging Infrastructure and High Water Loss

Water service delivery in Johannesburg, South Africa is constrained by:

- R27 billion infrastructure rehabilitation backlog
- High non-revenue water losses (~45%)
- Aging pipeline network (2,312 km of major water mains)
- Demand exceeding licensed supply from Rand Water
- Rapid population growth increasing system pressure
- Financial constraints affecting infrastructure maintenance
- Shortage of technical skills to maintain water systems



Rand Afrikaans University (RAU), pictured in 1969, stood as a prominent symbol of...

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Urban Water Infrastructure Challenges – South Africa



R27 billion
Infrastructure rehabilitation backlog



45%
Water lost before reaching consumers



2,312 km
Aging pipeline network



Skills shortage
Limited technical capacity to maintain infrastructure

Parliamentary Monitoring Group | South Africa



Source: Parliamentary Monitoring Group | South Africa

Legislation Governing Water Services in SA



Water Services Authority (WSA) – Key Roles

- **Responsibility:** Provide access to water services (directly or via Water Service Providers)
- **Monitoring:** Performance monitored by the Department of Water & Sanitation (DWS)
- **Functions:** Set service standards, manage water resources, ensure regulatory compliance
- **Accountability:** Ensure infrastructure delivery and equitable access to water services

Constitutional & Legal Framework

- **Section 27** of the Constitution: Right to access sufficient water
- **Compliance** with tariffs, service standards, and contractual obligations
- Monitoring and regulation of Water Service Providers (WSPs)

National Water Act (Act 36 of 1998)

Framework governing water resource management and service delivery in South Africa

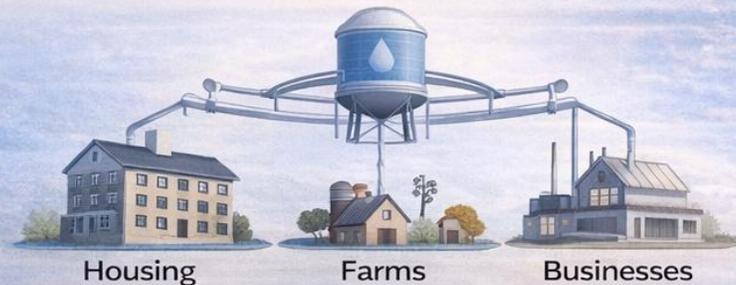


Key Insight: Legislation requires **accountability, compliance, and performance monitoring**, driving the need for **data-driven infrastructure and asset management systems**.

Water Services Intermediaries

Water Services Intermediaries

Intermediaries are entities obligated to provide water services on behalf of an authority or local government, especially for housing complexes, farms, and businesses.



Key Aspects:

-  **Compliance:** Must meet water quality standards (SANS 0241)
-  **Contractual Basis:** Operate under strict contracts defined by a Model Water Service Contract
-  **Oversight:** Municipalities monitor intermediaries closely

Model Contract Enforces Higher Standards



- ✓ Must meet **Water Quality Standards (SANS 0241)**
- ✓ Officials will closely monitor compliance and performance



Key Insight: Intermediaries must **comply** with stricter contractual standards and oversight to ensure water service quality.

Ministerial Interventions to Improve Water Service Delivery

New Water Services Amendment Act empowers the Minister to strengthen the performance and accountability of Water Services Authorities (WSAs).



Enforcement

Minister can enforce standards and rectify failures of WSAs and intermediaries



Enforcement

Minister can enforce standards and rectify failures of WSAs and intermediaries

Additional Approvals

Municipalities require approval as new service providers and must meet stricter operating standards



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Municipalities require approval as new service providers and must meet stricter operating standards

Licensing Oversight

Minister can suspend or revoke the license of failing water service providers if conditions



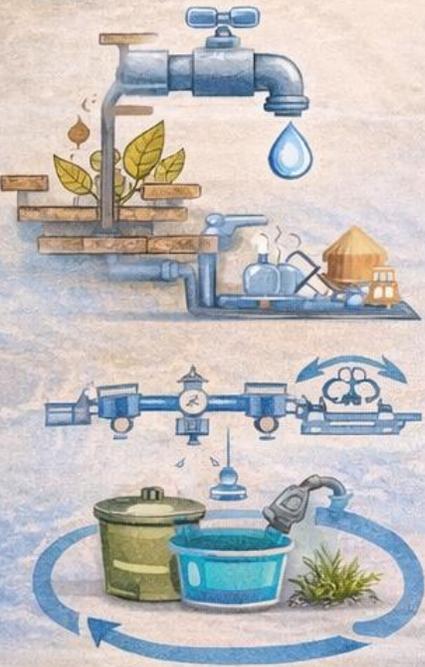
Licensing Oversight

Minister can suspend or revoke the license of failing water service providers



Key Insight: Intervention powers enable effective ministerial oversight, ensuring accountability and service performance improvements.

Water Optimization Strategy



Principle: Reduce, Reuse & Recycle Efficiently & Sustainably

- Identify correct water source, quality and match with functional use
- Reduce consumption and waste, increase resilience to climate change
- Based on a comprehensive water balance study of Stellenbosch University

 Reduce	 Reuse	 Recycle
<p>Focus: Limit water use</p> <ul style="list-style-type: none">• Create water-saving awareness campaigns• Refit residences with low-flow showerheads• Replant indigenous and drought-resistant vegetation• Install systems to capture grey water from showers and basins	<p>Focus: Capture alternative water sources</p> <ul style="list-style-type: none">• Intervene to optimize existing sources of water• Capture water from roofs and flush water from showers for supply to gardens• Install tanks to collect water from roofs• Bore holes to supplement existing sources to irrigate	<p>Focus: Enhance effluent quality</p> <ul style="list-style-type: none">• Reduce the amount of water entering the sewerage system• Improve the standard of water exiting the sewerage system

 **Goal: Implementing a holistic water optimization strategy to achieve sustainable and resilient water use**

Strategic Focus Areas - Facilities Management

Asset & Infrastructure Performance

- Improve performance of all infrastructure assets
- Buildings, service infrastructure, bulk services
- Focus on lifecycle efficiency and reliability

Maintenance Strategy (50:20:30 Model)

- Planned, Proactive, Reactive maintenance balance
- Improve efficiency and cost-effectiveness
- Reduce unplanned failures

Environmental Sustainability

- Integrated Environmental Sustainability Plan
- Embedded in planning, operations, and development
- Focus areas: Energy
 - Water
 - Waste
 - Carbon footprint
 - Behaviour change

Client & Stakeholder Management

- Client relationship management (CRM)
- Measure and track service delivery
- Engage all stakeholders (internal & external providers)

Utilities & Asset Optimisation

- Upgrade utilities management systems
- Develop live dashboards for infrastructure performance
- Optimise Total Cost of Ownership (TCO)
 - HVAC, Water
 - CCTV & Alarms

Risk & Compliance

- Risk reduction and legislative compliance
- Environmental and health considerations
- Minimise operational disruptions
- Implement institutional OHS systems



Key Insight: Integrated strategy enables data-driven, efficient, and sustainable facilities management across a

Paradigm Shift in Institutional Decision Making

- Commitment to Sustainable Development
- Total Cost Ownership - Long Term View (30 - 50 years)
- Installation of a pipe ring main for future developments

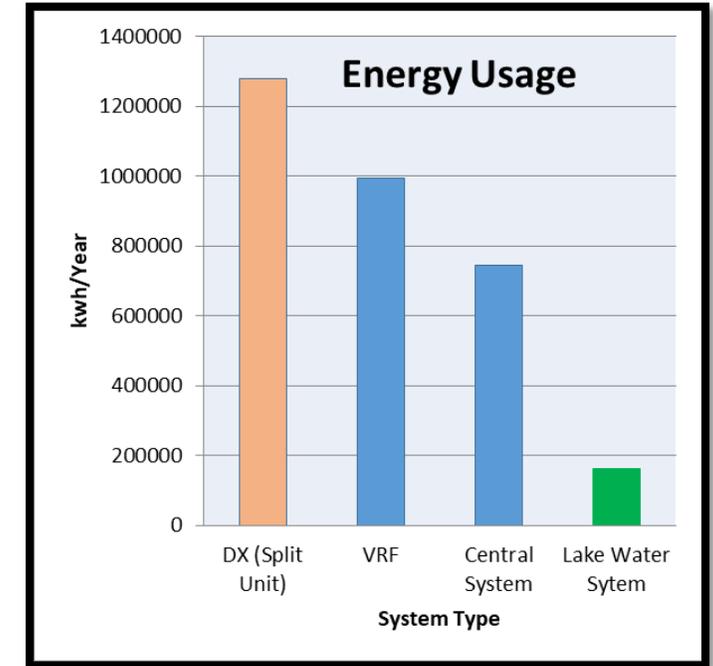
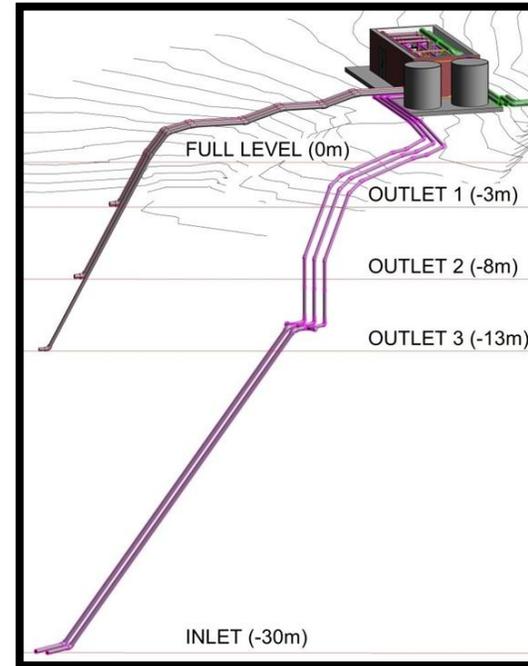
USB: Deep Lake Water Cooling Plant

Requirements

- Scope and size of plant
- 4 buildings - 13 000 m² - 2,300 kW cooling / 900 kW heating.

Advantages:

- ✓ Large energy cost saving
- ✓ Reduced Total Cost of Ownership
- ✓ Smaller Chiller Plant (sized on heating)
- ✓ Plant Consolidated in One Space

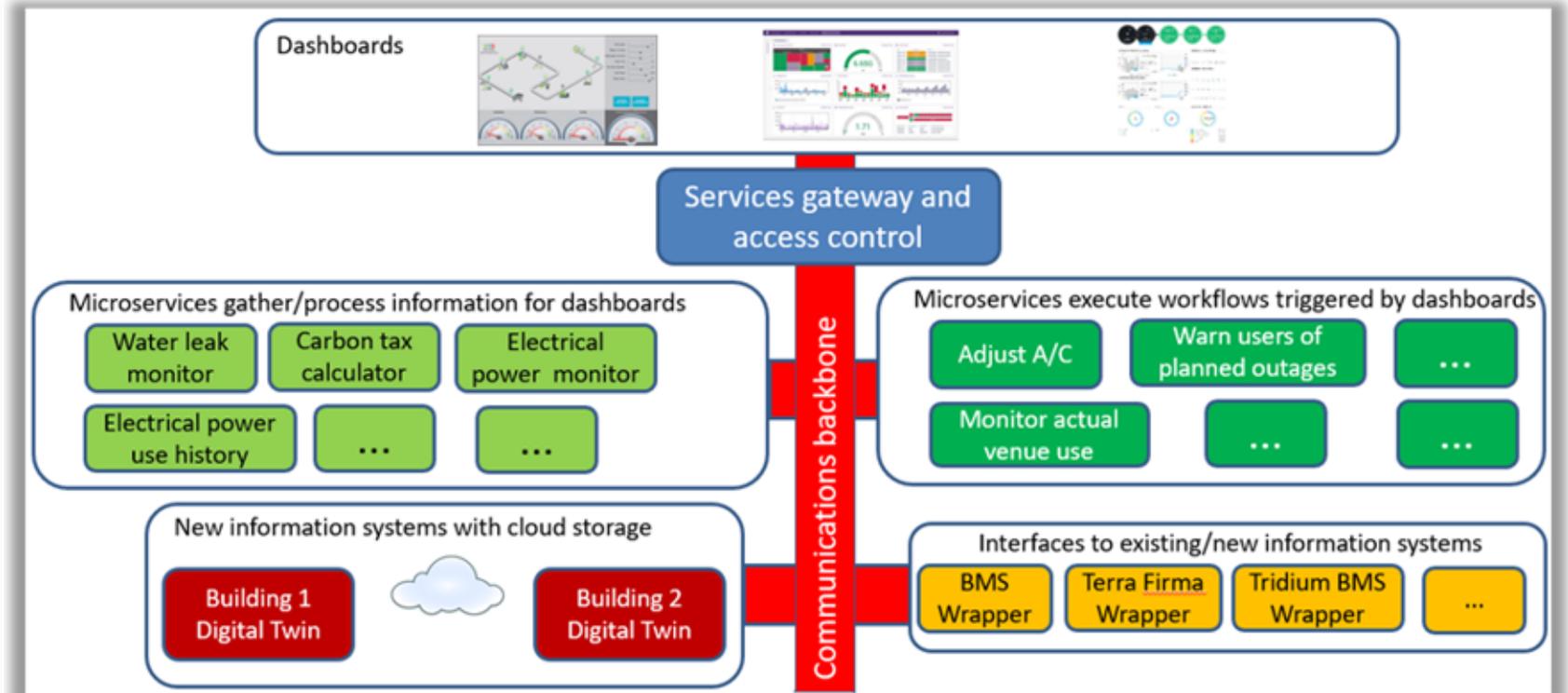
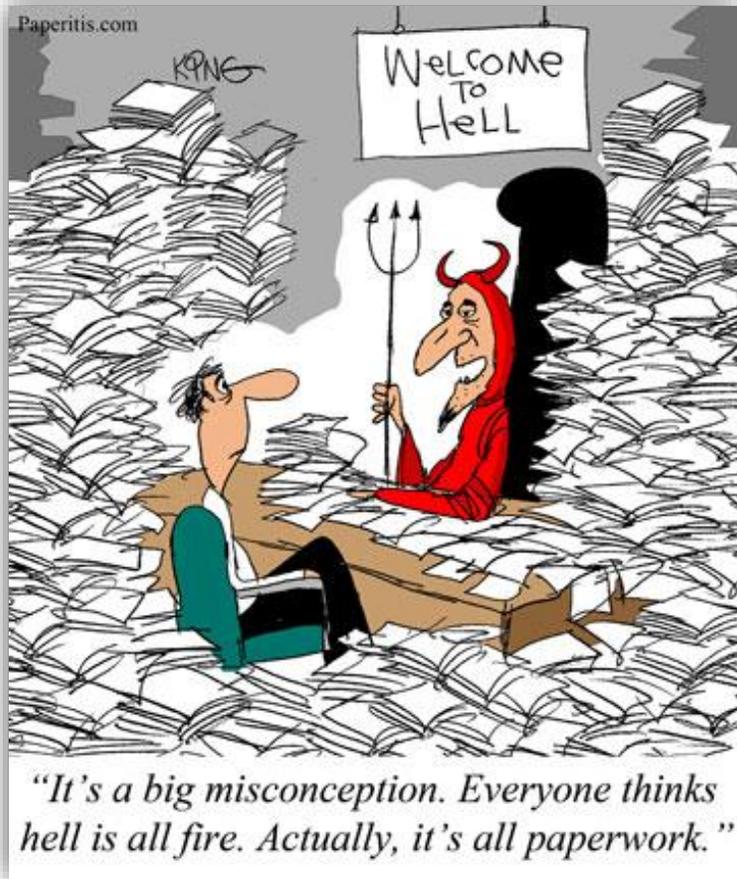


University of Stellenbosch Business School		
Typical COP and Tons of CO ₂ emitted		
13000m ² Complex		
System Type	COP	tCO ₂ e
DX (Split Unit)	2.5 - 3.5	1278
VRF	3.5 - 5.5	994
Central System	4.5 - 7.5	745
Lake Water Sytem	20 - 35	162



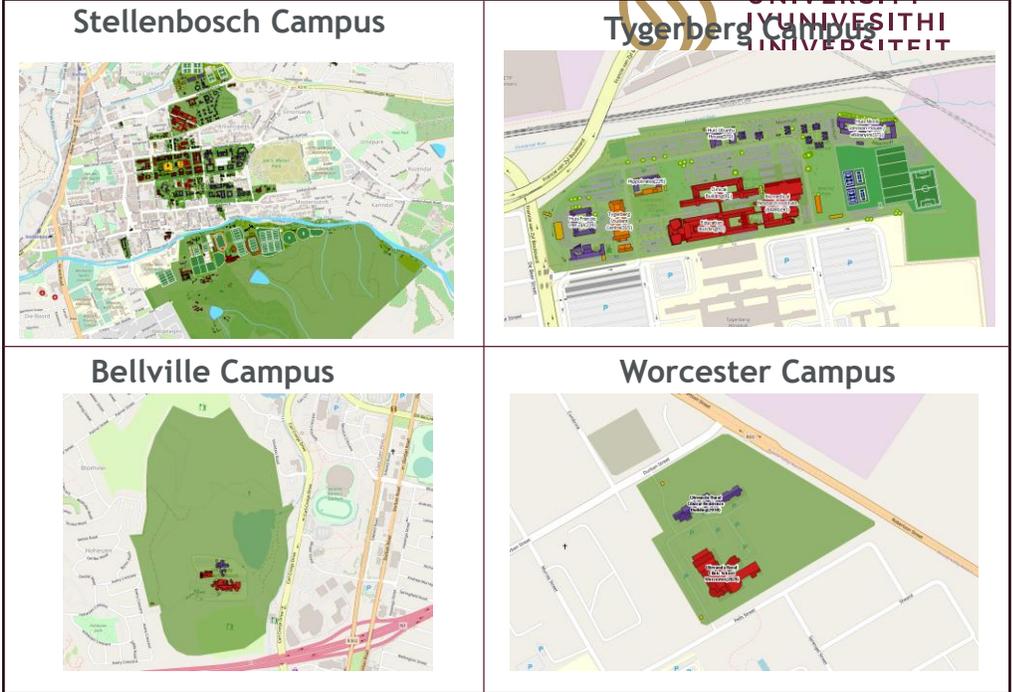
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Transition to Digital Twin & Data Management



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Case Study : Stellenbosch University



Campus	Erf Size (ha)	Building Size (SQM)
Stellenbosch & Mariendahl	796	634030
Bellville Business School	69	15169
Tygerberg	25	146293
Worcester	4	5757
Saldanha Military Academy	N/A	N/A
Brakkekuil	4498	3756



505
Total Buildings



5392 ha
Total Land owned



805005m²
Total Space Managed

"We cannot solve our problems with the same thinking we used when we created them."
 Alber Einstein

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Water



Potable water usage despite of interventions that were implemented during the drought-resilience measures of the water crisis and thereafter



Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

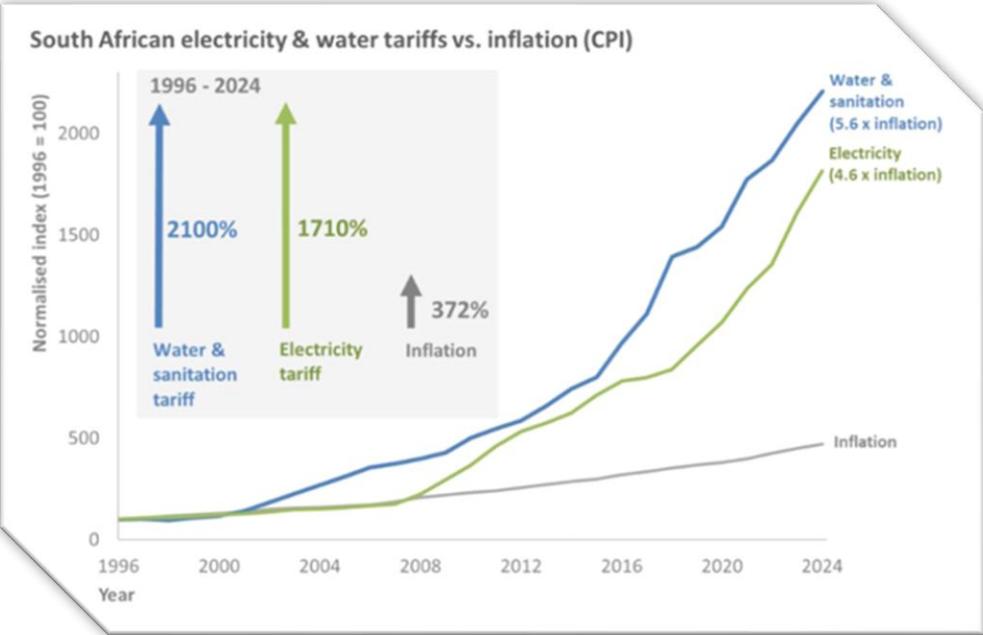
SSD CONTROLS

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WET SERVICES

- DOMESTIC PUMPS
- FIRE WATER MONITORING
- TEACHING HOT WATER
- SPORT FIELD IRRIGATION PUMP
- PRESSURE MONITORING
- PRESSURE DASHBOARD
- TREATED WATER PLANT
- HIPPOKRATES
- MAIN MENU

TYGERBERG MEDICAL CAMPUS



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DOMESTIC WATER PUMPS

SYSTEM B

PUMP 1

Control: Off
Run: Off
Trip: Normal
Speed: 0.00 %

PUMP 2

Control: Off
Run: Off
Trip: Normal
Speed: 0.00 %

PUMP 3

Control: Off
Run: Off
Trip: Normal
Speed: 0.00 %

PRESSURE CONTROL

Pressure: 43.34 kPa
Setpoint: 475.00 kPa

Manifold System
From Reservoir

455.7 kPa

SYSTEM A

PUMP 4

Control: On
Run: On
Trip: Normal
Speed: 63.1 %

PUMP 5

Control: Off
Run: Off
Trip: Normal
Speed: 0.0 %

PUMP 6

Control: Off
Run: Off
Trip: Normal
Speed: 0.0 %

PRESSURE CONTROL

Pressure: 455.7 kPa
Setpoint: 475.0 kPa

RESERVOIR LEVEL CONTROL

1.5 m

Tank Level: 1.8 m
Setpoint: 1.6 m

Valve Control: Open

Alarm: Normal
Alarm Setp: 1.2 m
Alarm Lane: 15.0 min

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TREATED WATER PLANT OVERVIEW

WET SERVICES

- DOMESTIC PUMPS
- FIRE WATER MONITORING
- TEACHING HOT WATER
- SPORT FIELD IRRIGATION PUMP
- PRESSURE MONITORING
- PRESSURE DASHBOARD
- TREATED WATER PLANT
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- MAIN MENU

ACTUAL VALUES

CHLORINE: 0.00 mg/L

PH: 3.35 pH

CONDUCTIVITY: 0.0000 S/m

0.30 bar

307.1 mm, 454.3 mm, 977.6 mm, 250.4 mm

BOREHOLE PUMPS Booster Pumps Circulation Pumps

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FIRE WATER MONITORING

TEACHING LS

HOSE REEL Pressure: 208.8 kPa

CLINICAL WEST LB

HOSE REEL Pressure: 147.3 kPa

HYDRANTS

Pressure: 8.8 kPa

HYDRANTS

Pressure: 7.8 kPa

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Sport Field Irrigation Pump

WET SERVICES

- DOMESTIC PUMPS
- FIRE WATER MONITORING
- TEACHING HOT WATER
- SPORT FIELD IRRIGATION PUMP
- PRESSURE MONITORING
- PRESSURE DASHBOARD
- TREATED WATER PLANT
- HIPPOKRATES
- MAIN MENU

Pressure 2: 487.8 kPa
Pressure 1: 438.3 kPa
Pressure: 0.3 kPa

Water Meter: 10792.4 KL

Valve Control: Close

Tank Level: 43.84824 KL

Pump Call off Level: 30 KL
Domestic Call off Level: 110.0 KL

Control Status: Off
Filling Flow: No Flow
Filling Pressure: 0.3 kPa
Call Off Value: 88.0 KL
Valve Position: Off
Backup Time: 3 hr

Filling Schedule:

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Institutional Intervention

Build resilience against present and future environmental shocks

Optimise existing sources and reduce dependence on Municipal supply



UWC:

Installed new borehole systems with tanks to supply water to campus



NWU:

Digital live metering system
New tanks to build



CPUT:

On site grey water retention and irrigation system



UFS:

Digital live metering system
Grey water system

- Grey water supply from treated wastewater pipe linked for irrigation water. (off potable and reduced cost)

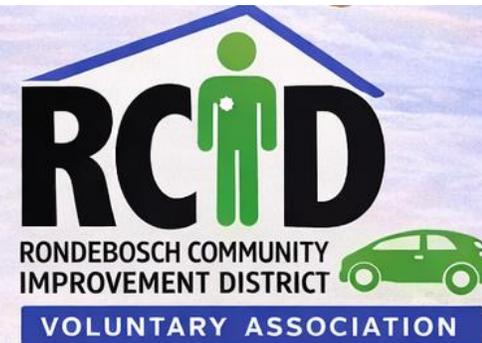
Optimising Sustainable Water
Supply Resources Across Western
Cape Universities

Rondebosch Community Improvement District (RCID)



Purpose: Focused on improving community safety and physical environment through supplementary services

Location: Rondebosch University Facilities Management, Mrondebosch (Reeries-4)



Rondebosch Community Improvement District (RCID)

- **Purpose:** Focused on improving community safety and the physical environment through supplementary services.
- **Key Initiatives:** Partners with service providers like Octotel to boost safety with fibre-connected security systems.
- **Location:** 65 Camp Ground Road, Rondebosch, 7701.
- **Contact:** Phone: 021 689 6423 | Email: bruceburmeisterarchitects@gmail.com



021 689 6423



Carltron Cernaed Doriel

RCID Stakeholders

Primary Private Sector Stakeholders

- **Property Owners:** Initiate the CID and fund its operations through levies, pay for membership to RCID NPC (UCT is a major stakeholder).
- **Commercial Tenants and Businesses:** Benefiting from improved safety and cleanliness.
- **Residents:** Homeowners and tenants benefiting from enhanced security
- **City of Cape Town:** Acts as primary partner, collects CID levies and oversees adherence to by-law.
- **South African Police Service:** The Mowbray and Rondebosch police are key safety partners coordinating with



Goal: Enhance campus safety by engaging with the Rondebosch CID and primary stakeholders to ensure a clean and secure campus environment.

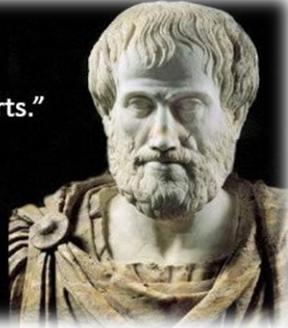
Q&A

Questions & Answers



"The whole is greater than the sum of its parts."

-Aristotle



Thank you
Enkosi
Dankie