

Water & Sanitation Africa



Complete water resource and wastewater management

Ramateu Monyokolo,
chairperson of Rand
Water and AWSISA

**Turning billing into progress for
Johannesburg's water system**

INDUSTRY INSIGHT

A collective voice for a
sustainable future



**NAVIGATING THE
REVISED NORMS
AND STANDARDS**

**GROUNDWATER
DOESN'T AGE LIKE
FINE WINE**

**MORE PRECIOUS THAN GOLD:
RAND WATER'S LEGACY OF
SERVICE AND INNOVATION**



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ON THE COVER

Founded in 1903 amid Johannesburg's early gold-rush chaos, Rand Water has spent more than a century proving that water, not gold, is South Africa's most valuable resource. From pioneering bulk supply systems to leading today's infrastructure megaprojects, the organisation continues to deliver dignity, development and resilience to millions. **P6**

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TURNING BILLING INTO PROGRESS FOR JOHANNESBURG'S WATER SYSTEM



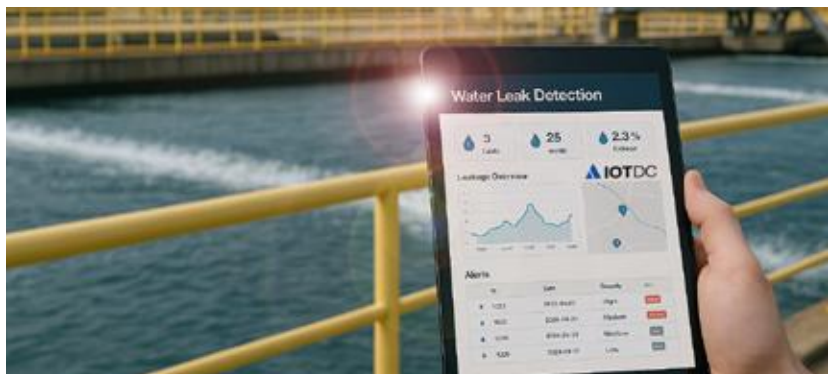
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INDUSTRY INSIGHT

The newly established Association of Water and Sanitation Institutions in South Africa (AWSISA) seeks to unite the sector in tackling its most pressing financial, operational, and governance challenges.

Kirsten Kelly speaks to Ramateu Monyokolo – chairperson of both Rand Water and AWSISA – about how this collective vision is being put into action. **P8**



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WATER IS A CALLING *and it takes all of us*

One of the best parts of my job is interviewing people I truly admire. Among them is the formidable Dr Esper Ncube – one of Africa's leading voices in water. When I asked what drew her to the sector, her heartfelt answer touched me deeply.

Growing up in Limpopo, Dr Esper Ncube knew the daily burden of fetching water long before she knew the science behind it. She recalls waking up before dawn to join other women and girls, who would walk long distances with 25-litre containers balanced on their heads. "I know the experience of waking up in the morning and not knowing where I will find water to fill my 25-litre container," she says.

Like Dr Ncube and most professionals in this sector – they have a calling. Water is far more than what flows from a tap – it is the thread that connects every aspect of life. It sustains a child's health and ensures that hospitals can perform life-saving procedures like dialysis. It enables farmers to grow crops and produce the food we eat. It keeps schools clean and functioning, industries running, and cities alive. It cools power stations, supports ecosystems, and provides dignity through sanitation. Every drop represents health, opportunity, productivity, and life itself.

To those who dedicate their careers to ensuring that others have access to clean water and safe sanitation – thank you. Your work often happens behind the scenes, under pressure, and without fanfare. Yet you are the quiet force sustaining our country's heartbeat.

May your passion continue to spill over and inspire the rest of us. Because water security cannot be achieved by one person, one company, or one institution alone. It takes all of us – engineers, scientists, policymakers, and citizens – to protect what sustains life.

Water is not just your calling. It is our collective responsibility.

And yet, South Africans seem to know their rights but shun their responsibilities. Perhaps our strong emphasis on rights has fostered a culture of entitlement where citizens are very vocal about what they are due from the state and others, but less focused on their reciprocal duties.

South Africans demand clean, reliable water and safe sanitation – and rightly so. But too often, we forget that these rights come with responsibilities: to pay for services, protect infrastructure, report leaks, avoid illegal connections, and use water wisely. Our culture of entitlement has led many to view water as an endless public good, rather than a shared and finite resource that requires collective stewardship. True water security depends not only on government delivery, but on every citizen honouring their duty to safeguard the very systems that sustain us.

This morning, on my community whatsapp group, a woman (who was exceptionally vocal when we were without water for a day) asked if someone can report a leak in our street. Somehow she believes she deserves consistent access to water but thinks other people should protect it. How can we change this? ●

Kirsten



COVER OPPORTUNITY

In each issue, **Water & Sanitation Africa** offers companies the opportunity to get to the front of the line by placing a company, product or service on the front cover of the magazine. Buying this position will afford the advertiser the cover story and maximum exposure. For more information, contact Sindi Moni on +27 (0)82 212 4574, or email sindi@infrastructurenews.co.za.

You said it in WASA

The opinions and statements shared by thought leaders in the water industry to **Water&Sanitation Africa**.



“Our work is more than the average nine-to-five job; it is about service, about providing dignity and life.” **Sipho Mosai, group chief executive, Rand Water**

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“Water is too important to be managed through ad hoc oversight and political interference. It requires technical consistency, financial sustainability, and public trust. We cannot allow different segments of the water value chain to operate in isolation, each pursuing their own interests, without anyone overseeing the system as a whole. We need a regulator that acts in the interest of both utilities and citizens, ensuring fair and transparent pricing. Let’s regulate for results. Let’s regulate for integrity.” **Ramateu Monyokolo, chairperson of Rand Water and AWSISA**

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“WISA stands ready to partner with municipalities, offering the tools, expertise, and training frameworks needed to build lasting institutional capacity. Municipal leaders who wish to strengthen their teams and embed a culture of excellence are encouraged to engage with WISA to co-create tailored solutions that turn professional standards into everyday practice.” **Dr Lester Goldman, CEO, WISA**

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“Considering that water management spans both national and local government responsibilities, how effectively have powers and functions been transferred from National Government to CMAs? This is particularly relevant given CMAs’ mandates to guide water resource management, develop catchment strategies, and support community participation. I recall during my time at Department of Water and Sanitation (DWS), the Department initially intended to establish 19 CMAs back then, this was reduced to nine and then ultimately further reduced to six due to the river systems, cost management and economies of scale.” **Dr Harrison Plenaar, Chairman, WISA**

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“With an ever-increasing focus on sustainability, industrial water reuse has become a critical practice. Endress+Hauser disinfection sensors can be used in industrial water plants to monitor and control the quality of reused water. Ensuring accurate disinfectant measurements that meet the required standards supports sustainable water management practices. Industrial plants can optimise their water reuse processes, reduce chemical input, and ensure a safe water supply. This is particularly important in industries such as food and beverage plants, where the quality of water is critical to product safety and quality. Our growth over the years have been driven by our commitment to innovation as well as the entrepreneurial spirit. Country managers are encouraged to run units like part of their own company, take calculated risks, and to innovate fearlessly. Globally, we have grown to over 2 500 employees, but we retain the flat organisations, streamlined processes, and quick decision-making of a company run by a family—lean and with a personal touch.” **Terene Govender, junior water and wastewater industry developer, Endress+Hauser**

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"Innovation, combined with advanced technical services and a wide array of products, is part of our renewed drive to help address wastewater issues in conjunction with municipalities in the country. KSB remains mindful of budgetary constraints and works within these limits to provide products and services that are cost-effective, versatile and reliable. At the same time, we have sourced other suitable solutions from across the globe that have been added to our local arsenal. Now, our next step is to work with consulting engineers and end users from various regions from the inception of their projects to ensure pump stations and treatment plants are designed to work effectively for at least the next 20–30 years."

Hugo du Plessis, market area manager for water, wastewater and irrigation, KSB Pumps and Valves

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"The law is clear. All meters must comply with SANS 1529 under the NRCS (National Regulator for Compulsory Specifications) legal metrology framework. Compliance lists exist on the NRCS and Jaswics databases. The few companies playing by the rules have invested millions to meet these standards. Yet they are being undercut by operators who import cheap, illegal, non-compliant products, sell them out of trading garage companies and even online, while faced with no consequences." **Bevan Davis, MD, Conver-Tek and Davis & Deale**

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"The best technology in the world cannot fix a broken business process. Implementing new technology – particularly at the scale required by public entities – inevitably comes with challenges. One of the most common pitfalls is failing to establish a clear, transparent business case with realistic and measurable return on investment. From the outset, it must be clear how much money the technology will save or generate, and which efficiency metrics it will improve. Both the client and the technology partner must remain accountable to these outcomes, with all stakeholders held to the same standard to secure and maintain buy-in. Unfortunately, South Africa has many examples where this critical step was overlooked."

Tiaan Coetsee, CEO and co-founder, IOTDC

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"Water is a monopoly service, so pricing is a critical issue for ensuring financial sustainability. The raw water pricing strategy, as required under the National Water Act, provides the framework for setting water use charges on raw water abstracted from rivers, dams, and other sources. This strategy does not cover the tariffs charged by municipalities or water boards, which were governed by the Water Services Act and fall under different regulatory frameworks. As tariffs are not regulated like in the energy sector, there is a need for an independent economic regulator to ensure a fairer water system in South Africa." **Dr Sean Phillips, director-general, Department of Water and Sanitation**

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"Most people first heard about wastewater surveillance during the COVID-19 pandemic, when it helped public health officials track outbreaks. But the idea has been around much longer. For example, the Global Polio Eradication Initiative has used it to confirm that countries are free of polio, and even law enforcement has tapped it to trace illegal drug production." **Daniele Lantagne, research professor, Feinstein International Center, Friedman School**

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"There are ongoing initiatives to train and equip municipalities on sanitation technologies. However, many still lack the ability to develop clear business cases, which makes it difficult to secure funding. Sanitation involves multiple government departments – from Human Settlements and Water and Sanitation, to Cooperative Governance, SALGA and Municipal Infrastructure Support Agency (MISA) Professionals across these institutions must be equipped with technical knowledge, financial modelling skills, and practical planning tools to evaluate, package and implement projects that demonstrate long-term viability to funders." **Nonhla Tau, specialist: Water and Sanitation at South African Local Government Association (SALGA)**

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"Founded in Benoni, Rainbow Reservoirs has experienced substantial growth in recent years, attributed to a consistent focus on quality, compliance, and innovation. From the outset, our goal was to design tanks that meet the Australian water industry standards, which are among the strictest globally. Even though we operate locally, we have always aspired to match international benchmarks." **Paul Warrener, development and marketing manager, Rainbow Reservoirs**

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More precious than **GOLD**

RAND WATER'S LEGACY OF SERVICE AND INNOVATION

Founded in 1903 amid Johannesburg's early gold-rush chaos, Rand Water has spent more than a century proving that water, not gold, is

South Africa's most valuable resource. From pioneering bulk supply systems to leading today's infrastructure megaprojects, the organisation continues to deliver dignity, development and resilience to millions.

“Our work is more than the average nine-to-five job; it is about service, about providing dignity and life,” says Sipho Mosai, group chief executive of Rand Water.

That ethos has guided Rand Water's growth from supplying water to the gold diggers of the Witwatersrand to becoming the largest water board in the Southern Hemisphere. Today, the utility provides bulk potable water to over 21 million people across Gauteng and parts of Mpumalanga,

the Free State and North West – an area spanning some 18 000 km².

Infrastructure

Recent milestones showcase both scale and foresight. Rand Water marked its 121-year anniversary with the launch of the 210 Mℓ Vlakfontein Reservoir – the largest cylindrical post-tensioned concrete reservoir in the world – and the commissioning of the Zuikerbosch Station 5A water-purification plant in Vereeniging. Together, these projects add resilience to the network and

demonstrate long-term planning in action.

“Building and maintaining infrastructure is key to bulk water provision,” says Mosai. “Station 5A and the Vlakfontein Reservoir showcase our commitment and discipline in seeing projects through even in difficult operating environments. They are the result of years of forward planning.”

Station 5A, valued at R4.8 billion, is the largest state-of-the-art purification facility in Africa. Officially launched by President Cyril Ramaphosa in 2025, it will provide a massive 600 Mℓ of purified water each day. The President's

- 1 Rand Water is the largest waterboard in the southern hemisphere
- 2 Founded in 1903 amid Johannesburg's early gold-rush chaos, Rand Water has spent more than a century proving that water, not gold, is South Africa's most valuable resource
- 3 Building and maintaining infrastructure is key to bulk water provision



WHO IS SIPHO MOSAI?

Sipho Mosai has been the group chief executive of Rand Water since 2019. Before that, Mosai was chief operations officer for 10 years. Mosai, a scientist by training turned strategist and business leader in the water sector, boasts over 20 years executive management and technical experience in bulk and distribution water operations; water infrastructure planning, maintenance, refurbishment, and upgrade; project management, scientific services, strategic asset management; and sector growth and development. Mosai has served as a non-executive and board member in various institutions. This includes serving on the Construction Industry Development Board (CIDB), where he chaired the Human Resources Subcommittee of the board in his first term and the chairperson of the Audit and Risk Committee in his second term. He currently serves on the boards of the Rand Water Foundation and Rand Water Services as a non-executive director. Mosai holds the following qualifications:

- Bachelor of Science (University of the North)
- Bachelor of Science (Hons) (University of the North)
- Master of Science (University of Free State)
- Post Graduate Diploma in Management (University of KwaZulu-Natal)
- Master of Business Administration (University of KwaZulu-Natal)



Sipho Mosai, group chief executive, Rand Water

message at the ceremony captured the plant's deeper significance: "Let the waters that flow through this facility be a testament to our commitment to provide clean and safe water to all our people."

For Mosai, those words encapsulate the heart of Rand Water's mission. "This project stands as a proud symbol of our shared determination to secure South Africa's water future. It represents not only an engineering achievement, but also a commitment to service delivery, resilience and equity. Every litre purified here reflects the collective effort of government, engineers, scientists and communities."

Financial prudence has underpinned these achievements. Rand Water recently settled its RW23 bond – listed under its R10 billion Domestic Medium-Term Note programme – at the principal amount of R1.23 billion. The bond matured in December 2023 and was redeemed through disciplined application of the Public Finance Management Act and the board-approved Corporate Treasury Policy. "Amid all the economic challenges, Rand Water invested its redemption reserves wisely, yielding a competitive return averaging 9.15%," notes Mosai. "We intend to use this approach to build

future sustainability and retain investor confidence."

Notably, throughout its 121-year history, Rand Water has never received a government bailout and remains fully self-sustaining. Fitch Ratings has affirmed its AA+(zaf) credit rating – a clear indication of strong liquidity, sound governance and low default risk.

Municipalities

Beyond infrastructure, Rand Water's evolving role in the municipal sphere reflects its willingness to tackle the

Station 5A, valued at R4.8 billion, is the largest state-of-the-art purification facility in Africa



STATION 5A ZUIKERBOSCH WATER PURIFICATION PLANT

- Location: Zuikerbosch Water Purification Plant, Vereeniging, Gauteng
- Launched: August 2025 by President Cyril Ramaphosa
- Project value: R4.8 billion
- Construction period: Initiated in 2019; commissioning and optimisation ongoing
- Water production capacity: 600 Mℓ/day – equivalent to filling 240 Olympic-sized swimming pools daily
- Purpose: To secure Rand Water's future supply capacity and meet rising urban demand across Gauteng, Mpumalanga, Free State and North West
- Project type: State-of-the-art water purification expansion forming part of Rand Water's long-term augmentation strategy
- Technology: Incorporates advanced coagulation, flocculation, sedimentation, filtration and disinfection systems, monitored through an integrated SCADA control network
- Engineering design: Built to allow modular expansion for future phases and to ensure operational redundancy during maintenance or peak demand
- Employment impact: Over 3 000 direct and indirect jobs created during construction; significant skills transfer in civil, electrical and mechanical trades
- Environmental efficiency: Reduced carbon footprint through energy-efficient pumping systems and optimised chemical dosing; full compliance with SANS 241, EPA and WHO water-quality standards
- Strategic importance: Strengthens supply resilience, supports regional economic growth and underpins South Africa's water security for decades to come

country's most pressing delivery challenges. "From a business point of view, it is extremely important for Rand Water to support municipalities in the delivery of water," says Mosai. "Many municipalities are taking strain, and we feel that strain through late or non-payment. It therefore makes sense for us to enter that space in a financially sustainable way."

One example is the Section 63 intervention in the Emfuleni Local Municipality, where Rand Water was appointed by the Department of Water and Sanitation as implementing agent for the Sedibeng Sewer Scheme and Vaal River System Interventions. The success of that assignment prompted the revival of Rand Water Services – a subsidiary created to partner with the private sector and municipalities on water and sanitation delivery.

"Rand Water Services will operate as an independent, professionally run special-purpose vehicle," explains Mosai. "It will manage operations, maintenance and billing, ring-fencing revenue for water and sanitation activities so that funds are not absorbed into wider municipal budgets. This is how we can ensure that every rand collected for water goes back into water."

He believes the proposed amendments to the Water Services Act will further enable such models, creating conditions for stronger collaboration between water boards and municipalities. "There is little point in having pockets of excellence like Rand Water when some households still go dry," he says. "We must be part of the solution."

SDGs

The organisation's approach aligns closely with South Africa's development goals and the United Nations Sustainable Development Goals (SDGs). Rand Water's operations directly support Goal 6 (Clean Water and Sanitation), achieving 99.70% on its water-quality composite indicator and maintaining uninterrupted bulk supply exceeding 24 hours. It also contributes to Goal 5 (Gender Equality) with 43% female staff and 76% female managers; Goal 8 (Decent Work and Economic Growth) with over 3 000 jobs created through the Rand Water Foundation; Goal 12 (Responsible Consumption and Production) via its Project 1600 water-efficiency programme; and Goal 13 (Climate Action) through energy-efficiency and carbon-reduction initiatives.

Education and advocacy remain another pillar. Through its Water Wise campaign, Rand Water educates communities, schools and industries about conservation and demand management. Its Water Wise Education Team runs workshops, roadshows and puppet shows promoting responsible water use, pollution prevention and source protection – helping to foster a culture of stewardship from classroom to community.

"Scaling water access isn't just about building more pipes," says Mosai. "It's about re-imagining how things are done, financed and measured. We are investing in modern infrastructure, strengthening partnerships and building the skills required to meet future challenges. This facility is more than a plant; it is a promise – a promise

to deliver life-giving water now and for generations to come."

Rand Water's constructive engagement with stakeholders is guided by five corporate values: innovation, excellence, caring, partnership and integrity. "These values shape our behaviour and our accountability," Mosai emphasises. "Our reputation rests on the value we deliver and how we support South Africa's economic and social development agenda."

While proud of what has been achieved, Mosai is mindful of the challenges that lie ahead: climate stress, financial instability in municipalities and widespread non-payment for bulk water. "Hard work and innovation must inspire municipalities to reticulate the water they receive from Rand Water to every tap," he urges.

Quoting President Ramaphosa, he adds: "Water is not just a basic human need. It is the lifeblood of any thriving society. It sustains life, supports industry, empowers agriculture and fuels innovation." For Mosai, that belief defines both the past and the future of Rand Water. "The legacy we are building is one of resilience, innovation and inclusive water provision – a legacy proving, once again, that water is truly more precious than gold." ●



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Vlakfontein is the largest cylindrical post-tensioned concrete reservoir in the world





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A COLLECTIVE VOICE FOR A SUSTAINABLE WATER FUTURE

The newly established Association of Water and Sanitation Institutions in South Africa (AWSISA) seeks to unite the sector in tackling its most pressing financial, operational, and governance challenges. **Kirsten Kelly** speaks to Ramateu Monyokolo – chairperson of both Rand Water and AWSISA – about how this collective vision is being put into action.



Comprising seven water boards, various catchment management agencies (CMAs), the Water Research Commission (WRC) and the Trans Caledon Tunnel Authority (TCTA), AWSISA's objective is clear: to build a united front capable of addressing the sector's deep-rooted financial, operational and governance challenges.

Monyokolo explains that a collective voice has already led to tangible results. "In the past, when individual water boards approached government about issues such as municipal debt, we had very little impact. But through AWSISA's unified platform, we successfully

lobbied National Treasury to withhold equitable share transfers to 18 defaulting municipalities – a first in South Africa's history."

Debt

Municipal debt to water boards has ballooned into a systemic risk for the entire water value chain. Currently, municipalities owe water boards roughly R28 billion. Rand Water is owed R8 billion, which is double the amount owed in 2020. When municipalities default on payments for bulk water, water boards lose critical operating cash and are forced to cut back on essential maintenance, delay capital renewals, and

reduce reserves – this can potentially compromise system reliability and water quality downstream.

"The collapse of municipalities leads to the collapse of boards. When municipalities fail to pay water boards, merging or dissolving those boards doesn't solve the problem. We need partnerships – not amalgamations – where municipalities and water boards jointly manage water and sanitation through special-purpose vehicles (SPVs)," says Monyokolo.

SPVs

He adds that water boards are experts in the provision of water. "We have



The Vaal Dam



1

- 1 The collapse of municipalities leads to the collapse of boards
- 2 The collapse of municipalities leads to the collapse of boards
- 3 Leaks occur for several reasons – some stem from neglected maintenance of reservoirs, pipelines, valves and meters, while others result from theft and vandalism

successfully built and maintained water treatment plants, reservoirs and booster stations and can assist municipalities in strengthening their own water infrastructure. Water boards have the balance sheets to attract funding and have the technical expertise, institutional capacity, and operational experience to help professionalise and capacitate the rest of the water value chain. Public-public partnerships between water boards and municipalities is a great solution.”

Public-public partnerships between waterboards and municipalities have already occurred via Section 63 of the Water Act. This is where the Minister of Water and Sanitation assigns responsibility for water service provision (wholly or partly) to another competent organisation



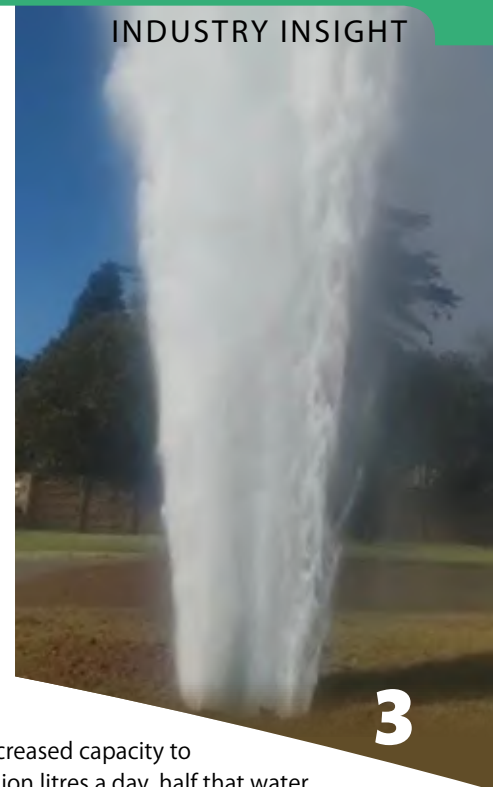
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(such as a water board) when there’s a breakdown in service delivery. Section 63 provides a funded mandate, ensuring that financial resources accompany the transfer of responsibility for service delivery. This mechanism has been applied at Emfuleni Local Municipality, where Rand Water was appointed to address sewage pollution and upgrade wastewater treatment works, and at uThukela District Municipality, where uMngeni-uThukela Water was tasked with managing and maintaining water and sanitation infrastructure.

According to Monyokolo, Section 63 is a short term intervention as Treasury has limited budget. “It is effective, but it is not a permanent solution. The introduction of SPVs will eliminate the need for Section 63 interventions.”

With an SPV, the operations, assets, revenue and grants relating to the water and sanitation division of a municipality would be ring-fenced. Rand Water is piloting the country’s first SPV with the Emfuleni Local Municipality. Approved by both the Minister of Water and Sanitation in November 2024 and National Treasury in June 2025, the initiative aims to ring-fence water and sanitation revenues, professionalise operations, and attract private financing for infrastructure upgrades. A process is underway to appoint an interim board and the SPV is likely to be launched in December.

Monyokolo says such models will help tackle non-revenue water, which now averages around 49% nationally. “In Gauteng, even though Rand Water



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has increased capacity to 5.6 billion litres a day, half that water is lost through leaks, theft and poor maintenance. The more water we pump into the system, the more water we lose through leaks.”

Leaks occur for several reasons – some stem from neglected maintenance of reservoirs, pipelines, valves and meters, while others result from theft and vandalism. In certain cases, individuals illegally tap into pipelines to steal water, while the so-called ‘water mafia’ deliberately damages infrastructure to secure repair or water tanker contracts.

Informal encroachments

“Tampering with bulk water pipelines is extremely dangerous and can lead to loss of life due to the high pressure in these systems,” explains Monyokolo. “. Speaking from a Rand Water perspective, these encroachments pose serious safety risks and make it difficult for our teams to access sites for maintenance or emergency repairs.”

The situation is made more complex by social and political sensitivities. Many of the people living on



Ramateu Monyokolo, chairperson of both Rand Water and AWSISA



Illegal water use is often associated with informal encroachments, where settlements, dwellings or businesses are built directly over or alongside critical infrastructure such as pipelines, valve chambers and reservoirs



water board servitudes do so out of necessity, driven by housing shortages and unemployment. As a result, eviction or relocation efforts can be highly contentious, requiring coordination with municipalities, law enforcement, and community leaders. "Rand Water has adopted a collaborative approach, focusing on community engagement, awareness campaigns, and partnerships with local government to prevent new encroachments while addressing existing ones through negotiated solutions. Despite these efforts, informal encroachments continue to expand with urbanisation and population growth across Gauteng. The combination of safety risks, access constraints, illegal water connections, and social pressures continues to make informal encroachments one of Rand Water's most persistent and complex operational challenges," adds Monyokolo.

Independent regulator

In addition to lobbying for assistance with municipal debt, AWSISA is calling for an independent regulator. An independent regulator would act as a central watchdog, ensuring tariffs are fair, infrastructure is maintained, and all service providers (public and private) meet agreed-upon standards. It would also provide consumers with a place to report grievances and allow service providers to operate in a stable, transparent framework that promotes investment and innovation.

Monyokolo cites an example where parliament blocked water boards from implementing a water tariff increase in 2020 due to the Covid epidemic and economics of the country, yet municipalities

increased their water tariffs up to 20% during the same year. Water boards and municipalities are not subjected to the same level of regulation. "Water is too important to be managed through ad hoc oversight and political interference. It requires technical consistency, financial sustainability, and public trust. We cannot allow different segments of the water value chain to operate in isolation, each pursuing their own interests, without anyone overseeing the system as a whole. We need a regulator that acts in the interest of both utilities and citizens, ensuring fair and transparent pricing. Let's regulate for results. Let's regulate for integrity."

The establishment of an independent regulator was endorsed at the Presidential Indaba, but progress since then has been limited.

Opportunities for water boards

The Water Services Amendment Bill and accompanying reforms have far-reaching impacts on water boards. "This Bill creates a massive opportunity for water boards. It gives us an opportunity to move within the reticulation and

sanitation space. We are also excited about the possibilities of water reuse and reclamation," states Monyokolo.

Another opportunity for local water boards is to expand their footprint and operate in other African countries. "Rand Water recently won a tender in Zanzibar. We have raised funding to move into that area and have been given a guarantee by the Tanzanian government. Unfortunately, we have yet to receive permission from the Minister of Finance to fulfil the tender requirements. This is extremely frustrating and has a negative effect on relations between the two countries," explains Monyokolo.

He adds that it is important for national government to create an enabling environment for water boards to function effectively. "It cannot take years for SPVs to be approved or for permission to operate across South African borders.

Currently, municipalities owe water boards roughly R28 billion





It is nearly impossible to grow and function with these constraints.

Governance and capacity building

Through AWSISA, there is benchmarking amongst waterboards that involves comparing performance against specific indicators to identify best practices and areas for improvement. "This is intended to improve overall service delivery, efficiencies, governance, maintenance, financial management and obviously water quality. The process identifies systemic weaknesses and shares solutions," says Monyokolo.

He emphasises that stable governance is essential for ensuring water security, as the success of bulk water provision is premised on capable and credible accounting authorities, specifically boards of directors. "AWSISA holds workshops for newly appointed board members on the delegation of authority and board charters."

The appointment of water board members is a transparent, legislated process that ensures only qualified and experienced professionals are selected to serve. These board members are appointed to provide strategic leadership, governance, and oversight, ensuring that the entity operates efficiently, complies with all legal and financial requirements, and fulfils its public service mandate. The Minister gives the board key performance indicators through a shareholders compact.

"Unlike municipalities with fragmented service delivery, water boards focus exclusively on water and sanitation, allowing them to develop deep, specialised knowledge. We also develop

long-term strategic plans that transcend political leadership changes. For instance, the Rand Water Station 5A purification plant, launched this year, and the 210 Mℓ Vlakfontein Reservoir, completed in 2023, were both initially planned as far back as 2009. We are also fortunate that any new chief executive of a water board continues to implement the established strategic plan, unlike many new municipal managers who often halt previous initiatives and start afresh with their own plans," states Monyokolo.

He continues: "Ethical leadership and good governance are non-negotiable. Without them, no amount of investment will bring sustainable water security."

AWSISA has signed memoranda of understanding with Swedish Water House, the Finnish Water Forum, and the UN-affiliated IHE Delft Institute in the Netherlands to strengthen skills and research collaboration. Rand Water itself plans to open a dedicated technical college and, eventually, a university specialising in water and sanitation.

Looking ahead, AWSISA intends to expand its influence beyond South Africa's borders. "Rand Water is already Africa's largest bulk water utility (providing water to 21 million people), yet it has no continental footprint," says Monyokolo. "Our vision is to export our governance, technical expertise and professional standards to other African markets. South Africa has world-class water management capacity – it's time we share it."

AWSISA's upcoming conference, to be held from 9 to 13 November 2025 at Emperors Palace, will bring



Section 63 has been applied at Emfuleni Local Municipality, where Rand Water was appointed to address sewage pollution and upgrade wastewater treatment works

together government, utilities, and international partners to tackle pressing water and sanitation challenges. The event will also serve as a platform to advance discussions on legislation, SPV partnerships, and practical steps toward achieving SDG 6.

"Our message to delegates is simple," concludes Monyokolo. "Collaboration is no longer optional. Water boards, municipalities and national government must work together if we are to restore water security, dignity and trust. Water is life – and we must protect it collectively." ●



www.awsisa.org.za

Municipalities sit at the front line of public service delivery. When water fails to flow, refuse is left uncollected, or roads fall into disrepair, citizens lose faith not only in local government but in the promise of the state itself. **By Dr Lester Goldman, CEO, WISA**

RAISING THE BAR: HOW STANDARDS AND TRAINING DRIVE MUNICIPAL EXCELLENCE

Municipalities can perform better – consistently and sustainably – when standards are clear, training is continuous, and staff are empowered to take ownership of outcomes.

Standards as the foundation of performance

Municipal performance begins with standards that are specific, measurable, and locally relevant. Vague targets and shifting expectations create uncertainty, while clear benchmarks define what good service looks like. Standards should spell out expected service levels, maintenance intervals, response times, and measurable outcomes. Each one must be tied to a simple performance indicator and a transparent baseline so progress can be tracked and reported to both councils and residents.

Specifying that a burst pipe must be repaired within 48 hours – and tracking this publicly – turns accountability from an aspiration into a daily operational reality. When applied consistently, standards transform discretion into professional judgment rather than arbitrary decision-making. They also reduce waste, close loopholes for mismanagement, and restore confidence among both staff and citizens that municipalities can deliver.

Crucially, standards must be practical. They should reflect the realities of local infrastructure, budgets, and capacity, rather than mimic abstract national ideals. Locally calibrated standards – developed with input from

engineers, technicians, and community representatives – build ownership and trust. When enforced through regular monitoring and transparent reporting, they create a culture where reliability and responsiveness are the norm.

Training that builds capability and judgment

Standards alone are insufficient without competent, confident people to uphold them. Training must therefore evolve from once-off workshops into structured, ongoing development that combines classroom learning, on-the-job coaching, and mentoring to reinforce competencies over time.

Core modules should address technical skills, asset management, regulatory compliance, and customer service, while also emphasising ethical decision-making and accountability. Simulated field scenarios – such as responding to pump failures or sewage blockages – enable staff to practise diagnosis, prevention, and escalation in a risk-free setting. This practical focus

embeds learning and prepares teams for real-world challenges.

Mentorship and peer review programmes further consolidate skills by fostering continuous improvement and professional pride. Performance reviews should measure demonstrated competencies and learning progress rather than attendance at training sessions. In this way, training becomes an instrument of transformation, not a tick-box exercise. The return on investment is tangible: fewer service disruptions, lower lifecycle costs, and a workforce equipped to manage infrastructure sustainably.

Building resilient municipalities through standards and training

Through WISA's leadership in developing pragmatic standards, accredited training, and structured career pathways, South Africa's municipalities can evolve from reactive service providers into proactive, trusted institutions. When every official understands the standard, applies it consistently, and has the skills to maintain it, performance naturally improves – and with it, the quality of life for every citizen.

WISA stands ready to partner with municipalities, offering the tools, expertise, and training frameworks needed to build lasting institutional capacity. Municipal leaders who wish to strengthen their teams and embed a culture of excellence are encouraged to engage with WISA to co-create tailored solutions that turn professional standards into everyday practice. ●



WATER GOVERNANCE AT LOCAL LEVEL

Now that the Association of Water and Sanitation Institutions of South Africa (AWSISA) conference is upon us, it's an important moment to reflect upon our progress in establishing the additional catchment management agencies (CMAs).

**By Dr Harrison Pienaar,
chairman, WISA**

Last year, former Minister Senzo Mchunu launched four new CMAs (Vaal-Orange, Pongola-Umzimkhulu, Mzimvubu-Tsitsikamma, and Limpopo-Olifants) that will work alongside the existing Breede-Olifants and Inkomati-Usuthu CMAs.

CMAs are responsible for the planning, implementation and management of water resources. Secondly, they are tasked with coordinating the water-related activities of other water management institutions and water users within Water Management Areas (WMAs). CMAs are governed by Governing Boards (GBs) that are established by the Minister. The GB of a CMA must represent all of the stakeholders affected by water resource activities within the WMA, including local government.

Considering that water management spans both national and local government responsibilities, how effectively have powers and functions been transferred from National Government to CMAs? This is particularly relevant given CMAs' mandates to guide water resource management, develop catchment strategies, and support community participation.

I recall during my time at Department of Water and Sanitation (DWS), the Department initially intended to establish 19 CMAs back then, this was reduced to nine and then ultimately further reduced to six due to the river systems, cost management and economies of scale.

We must also consider whether catchment management strategies are advancing toward completion with meaningful input from water users and local communities. These strategies are essential to building water-resilient communities. At the same time, no CMA can operate in isolation – water systems are interconnected and highly complex, requiring strong collaboration across catchments.

Strengthening partnerships will be key to success. Universities, research bodies, private companies and civil society can each contribute specialised expertise, innovation and capacity building. By drawing on this broader ecosystem, CMAs can accelerate progress, enhance adaptive planning and ensure water resource management remains responsive to real-world challenges and local needs.



Hence the importance of full delegation of powers to all these water entities, through a genuine assessment of their governance status quo, managerial and technical operations budgets, as well as status on meeting their strategic goals for effective water management, amidst the current climate of persisting challenges in managing the country's limited water resources effectively.

During AWSISA, a platform for genuine discussions concerning issues of financial viability, employee costs, and governance, transparency and community involvement should be encouraged. Equally, pressing issues such as budget constraints must also be addressed, with solutions already proposed for innovative funding mechanisms and public-private partnerships to improve sustainability. Lastly, the possible interventions and/or policy support mechanisms provided to CMAs concerning water user associations (within CMA area of jurisdiction) and its operations must also be encouraged. ●



CORROSION PROTECTION FOR WATER DISTRIBUTION SYSTEMS

Corrosion – the gradual deterioration of materials caused by environmental exposure – poses a major challenge in maintaining water distribution systems.

To tackle this issue, WISA hosted a seminar focused on understanding corrosion and exploring a range of effective prevention and mitigation strategies.

the study monitored AC/DC densities, coating performance, and corrosion behaviour. The study's findings showed the importance of anti-corrosion mitigation strategies in cathodic protection.

Botha's second presentation emphasised the economic impact of corrosion, the role of coatings and linings, CP fundamentals, and anti-corrosion interference mitigation. He stressed the importance of designing for local conditions, including rural and urban contexts, while addressing challenges such as vandalism, theft, and limited specialist capacity. He also highlighted emerging approaches such as the Internet of Things (IoT) enabled monitoring, modular CP systems, and integrated security strategies.

Louis Pretorius, past president of the Corrosion Institute of Southern Africa, detailed the development of DWS 9900 Specification (edition 2). This national specification, which deals with corrosion best practice, was originally meant to replace SANS 1217. It took nearly a decade to be reviewed by the Corrosion in the Water Industry Forum (CITWIF). He also presented on the

Lesotho Highlands Tunnel Refurbishment Project, undertaken by Corrocoat.

The project rehabilitated over 21,000 m² of transfer and delivery tunnels, requiring extensive logistics, continuous 24/7 operations, and innovative solutions to water ingress and access constraints. The project was completed with a third-party inspection sign-off and no major safety incidents.

Rivaan Ajodapersad, from uMngeni-uThukela Water, outlined

Peter Fischer from Nicholas O'Dwyer Consulting opened the seminar by covering the definition of corrosion, differentiating it from rust. He provided an overview on the types of corrosion, including:

- **Uniform:** This occurs evenly across the surface of the metal, making it the easiest to predict and manage.
- **Pitting:** This is when small holes or cavities appear on the surface of a metal. It is accelerated by chloride ions.
- **Galvanic:** This occurs when two dissimilar metals are in contact and in the presence of an electrolyte. The more "noble" metal is protected, while the less noble one corrodes faster.
- **Stress cracking:** This type of corrosion occurs when a metal is under tensile stress in a corrosive environment, leading to crack formation and propagation.
- **Microbiological:** Microbiological corrosion is caused by the metabolic activity of microorganisms on a metal surface.

Fischer offered practical approaches to controlling corrosion through coatings, linings, resistant materials, and cathodic protection.

Craig Botha of Re: Ignite presented a study co-authored with Eugene D'Souza and Hasan Sabri of Kuwait Oil Company.

The study used low-resistance Sabkha soil, which is found in arid-to-semiarid coastal mudflat or sandflat, where evaporite minerals like salt accumulate due to the fluctuation of high groundwater levels and capillary action. The study tested 3-Layer-Polyethylene (3LPE), a high-performance coating system used to protect pipelines from corrosion and physical damage, and hyper-branched polyurethane. Both coatings had artificial defects, and



From left: Coert Grobler (Corrocoat), Louis Pretorius (Corrosion Institute of South Africa & Corrocoat), Rivaan Ajodapersad (uMngeni-uThukela Water), Craig Botha (Re:ignite), Peter Fischer (Nicholas O'Dwyer), and Donovan Styger (DENSO)



the operational perspective of asset management. He highlighted the hidden costs of operations and maintenance that depend on the quality determined by the Engineering Council of South Africa's (ECSA) stages one through six. The presentation included a case study where a 65-year-old bitumen-lined pipeline that is still performing was contrasted with a 12-year-old epoxy-lined pipeline that

is failing prematurely. This approach to asset management also details several challenges, such as vandalism of CP units, aggressive soils, and servitude encroachment.

Denso and Corrocoat showcased the latest in anti-corrosion options. Denso showcased tape and epoxy-based systems, including their self-healing visco-elastic Viscotaq technology, while Corrocoat highlighted its global

footprint, advanced glass-flake coatings, turnkey anti-corrosion services, and long-life polymer solutions.

Corrosion represents a significant problem if unaddressed, and the seminar reiterated the importance of specifications, the need for proactive asset management, and the role of innovation and training in building a sustainable corrosion management culture. ●

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TURNING BILLING INTO PROGRESS FOR JOHANNESBURG'S WATER SYSTEM

Johannesburg Water has regained control of its billing from the City of Johannesburg – a strategic move to enhance billing accuracy, resolve customer queries faster, and ensure that every rand can be collected and channelled back into maintaining and upgrading the city's ageing water and sanitation infrastructure.

By Kirsten Kelly



For years, residents have voiced frustration about inaccurate accounts, delayed responses to billing queries, and a lack of clarity on where their money goes. The problem can be traced back to the early 2008 and 2009 when the City of Johannesburg centralised billing for City Power, Pikitup and Johannesburg Water under Project Phakama. The idea was to give customers a single consolidated bill covering water, electricity and waste services. Under Phakama, the city migrated its billing system onto a SAP platform that could run the integrated and complex operations of the city. Unfortunately, the project faced widespread criticism following its launch, with thousands of residents finding issues with their accounts.

Underinvestment in water and sanitation infrastructure

"Beyond billing inaccuracies and slow response times, water and sanitation infrastructure suffered major underinvestment following the launch of Project Phakama. This was

largely because revenue from water services was pooled into the City's central account and distributed across multiple service departments. This approach left Johannesburg Water underfunded, limiting our ability to repair or replace critical infrastructure. In around 2007, Johannesburg Water was investing over R1.1 billion annually back into infrastructure. In 2022, that figure dropped to R800 million and subsequently during 2025-2026 financial year the figure has now increased to R1,7 billion to catch up with the backlog. We are now facing a R27 billion infrastructure backlog," explains Kgaugelo Mahlaba, CFO, Johannesburg Water.

Johannesburg Water's infrastructure assets have a current replacement value of R125-billion. According to the utility's asset management plan, 2% of this value should be renewed each year to maintain system functionality.

However, due to a lack of funding, only 0.9% is being renewed annually – resulting in the significant infrastructure backlog.

Notably, 26% of Johannesburg Water's infrastructure is expected to reach the end of its lifespan within the next decade. This means that Johannesburg Water needs to invest an estimated R3.1 billion annually over the next 10 years to replace and upgrade infrastructure – but current funding levels fall far short of this requirement.

Trading reforms underway

To tackle this, Johannesburg Water is rolling out a turnaround strategy aligned with the National

Kgaugelo Mahlaba, CFO,
Johannesburg Water



Treasury's Trading Services Reforms for metropolitan municipalities, which reward metros that adopt certain reforms with additional capital funding.

Some of these reforms include ring-fencing revenue from the sale of water for the water function, as well as creating single-point accountability for the water function in the city. "I'm proud to say that these reforms are now in place. We are producing our own financial statements and have control over support services like human resources and procurement. We have also developed a turnaround strategy and performance improvement action plan with key performance indicators as well as other initiatives to further strengthen our governance. This has all been approved by council and submitted to Treasury in order to access the incentive grant," says Mahlaba.

While residents will still receive a single consolidated statement from the city, Johannesburg Water now has the final say on its own accounts and tariffs, subject to council approval. The shift means the utility can bill customers directly and manage queries.

Challenges

Johannesburg Water's non-revenue water (NRW) rate is incredibly high. "Even though it has recently dropped from 46% to 44%, it still means that nearly half of the water produced never reaches paying customers – a massive financial and operational loss for the city," notes Mahlaba.

NRW costs the entity R3 billion a year. On top of this, non-payment adds another R4.8 billion in lost revenue. Unauthorised consumption is close to 20 713 684 kℓ per annum. In total, Johannesburg Water loses approximately R7 billion annually from water losses and non-payment.

Adding to this financial strain is a social mandate – water is a human right. "We do have an expanded social package programme that gives qualifying indigent citizens free access of up to 15 kℓ free water per month. But they need to meet certain criteria and they must register for the programme," states Mahlaba.

Johannesburg Water has implemented a five-year water conservation and water demand management strategy. This plan includes repairing leaking reservoirs, upgrading zonal bulk meters, improving pressure management, enforcing by-laws and replacing old pipes and valves. The strategy aims to reduce water demand by 37 123 Mℓ annually.

Billing and disconnections

"Billing inaccuracies are often a result of faulty water meters. Some meters are stolen and tampered with, while other meters are broken and need to be fixed or replaced. We sometimes have to resort to estimation, however, meters must be read at least twice within a financial period. Johannesburg Water aims to read over 90% of our meters every month to avoid billing inaccuracies between the actual meter reading and an estimated meter reading. There are hostile areas where we are unable to read meters, as our technicians are vulnerable to violence from communities, hijackings or residents setting dogs on them," states Mahlaba.

He adds that Johannesburg Water has formed a joint committee with the metro police where they work together to disconnect illegal connections and connections of non-paying citizens. "However, cutting water is not as easy as cutting power. For example, a Level 3 disconnection often involves the use of an excavator where a water meter is removed. This is a costly exercise."

"We bill approximately 329 000 accounts monthly and are



currently dealing with just under 5 000 queries. This is a marked improvement from the past, when just six people were allocated to resolve complaints city-wide. While the ratio between accounts billed and queries issued is not significant, we are very focussed on further reducing the number of open queries. Every query matters, but the real solution is to be proactive and find issues before a query is even logged and this can be done through smart meters and the better management of data. We are working with the University of Johannesburg to better analyse and collate our data," comments Mahlaba.

He concludes by saying that Johannesburg Water is determined to improve customer service. "We want to be customer-centric and change our image from the past. Johannesburg Water belongs to its residents. It should be seen as a trust fund that looks after everyone's needs. Every rand collected must go back into the system to ensure that when you open your tap, water flows reliably." ●



REFORM ON THE AGENDA: 105 WORST-PERFORMING MUNICIPALITIES UNDER SCRUTINY

With 105 of South Africa's 144 Water Services Authorities in critical or poor condition, Parliament's Portfolio Committee on Water and Sanitation has turned its focus to the country's collapsing municipal water and sanitation systems.



The Committee session, which brings together the Department of Water and Sanitation (DWS), the Department of Cooperative Governance and Traditional Affairs (COGTA), the South African Local Government Association (SALGA) and Members of Parliament, highlights the depth of systemic failure and the scale of intervention required.

Leonard Jones Basson, a Democratic Alliance member and the committee meeting Chairperson, stresses the urgency of tackling the continuing crisis in municipal water and sanitation services. He reminds members that "although notable progress has been made since 1994, municipalities remain the weakest link in the water value chain. Millions of citizens continue to experience inadequate or failing services."



DWS presentation: systemic collapse revealed

Minister of Water and Sanitation, Penny Majodina, emphasises that while DWS provides infrastructure grants and technical assistance, "the poor performance of municipalities is often due to systemic governance failures, not just infrastructure deficits". She insists municipalities remain constitutionally responsible, with the Department's role limited to support rather than takeover.

Dr Risimati Mathye, deputy director, general of water services management for DWS, explains that the reinstated Drop reports, Blue Drop for drinking water, Green Drop for wastewater, and No Drop for water-use efficiency, reveal that 67 municipalities fall into the "critical" category, while 38 are rated "poor". Collectively, these 105 represent 73% of all Water Services Authorities.

"Water service collapse is not only a technical matter, but also a reflection of weak governance, corruption, and poor financial management," says Mathye.

The Drop reports identify widespread failings, including deteriorating infrastructure, inadequate maintenance, non-compliance with testing requirements, staff shortages, and high levels of non-revenue water. COGTA's 'State of Local Government Report' corroborates these findings, listing 35 distressed municipalities, most of which overlap with the DWS's list.



Leonard Jones Basson, a Democratic Alliance member and the committee meeting Chairperson

Minister of Water and Sanitation Penny Majodina



Interventions

To address these issues, DWS, COGTA and the Municipal Infrastructure Support Agency (MISA) are aligning support programmes. Prioritisation focuses on municipalities under Section 139 constitutional interventions, those deemed dysfunctional.

Mathye outlines six options to address municipal failure, ranging from identifying distressed municipalities, implementing the Municipal Performance Turnaround Strategy (MPTS) using Section 139 interventions and constitutional amendments to remove municipal authority over water services to sector reforms introducing a utility-based model.

To counter persistent under-performance, DWS is shifting tactics by converting under-utilised Schedule 5B direct grants into Schedule 6B indirect transfers, thereby empowering implementing agents to oversee and execute projects directly. This safeguards against funds being returned to Treasury and accelerates delivery in municipalities where local capacity is weak.

In more severe cases, the Department may invoke Section 63 of the Water Services Act to assume responsibility, partially or wholly, for water and sanitation functions in failing Water Services Authorities. Examples of interventions include Rand Water stepping in at Emfuleni, Amatola Water supporting Makana, and Magalies Water assisting Tshwane's Hammanskraal. MISA has piloted indirect transfers in municipalities with a record of mismanagement, such as uThukela and Emfuleni.

Other initiatives include debt relief mechanisms for municipalities owing billions to water boards and Eskom, smart metering, non-revenue water reduction, and skills development programmes such as process controller training. A water partnerships office has been established within the Development Bank of Southern Africa to facilitate blended financing and public-private partnerships.

"There is no single solution," Mathye warns, "but sustained, coordinated reforms offer the most viable path."

The backlog in water and sanitation infrastructure in the 105 municipalities is estimated at R400 billion. Majodina reports that over the past five years, DWS has transferred approximately R30 billion in infrastructure grants to the 105 municipalities. A further R10 billion is earmarked for each of the next two financial years, representing more than 80% of the Department's municipal grant allocation. Department of Cooperative Governance and Traditional Affairs (COGTA) has provided an additional R43 billion via the Municipal Infrastructure Grant (MIG).

The Department has also launched the Nationwide Groundwater Intervention Programme, aimed at unserved communities still without piped water. This involves drilling boreholes, protecting springs, and building local operational capacity, in partnership with the Council for Geoscience and MISA.

In the Eastern Cape, projects cover Amathole, Chris Hani, Joe Gqabi, Dr

Beyers Naude, Makana, Kouga and other municipalities. The Free State includes work in Mafube, Matjhabeng, Maluti-a-Phofung and Moqhaka. In Gauteng, projects focus on Emfuleni, Lesedi, Rand West, Midvaal and Merafong.

KwaZulu-Natal has projects in all major districts, including Amajuba, Harry Gwala, iLembe, King Cetshwayo, Ugu and Zululand. Limpopo's five district municipalities, including Capricorn, Mopani and Sekhukhune, are beneficiaries. Mpumalanga projects span Emalahleni, Lekwa, Govan Mbeki and Mbombela.

The Northern Cape shows dozens of small-scale interventions, ranging from Joe Morolong to Dawid Kruiper. Some projects are complete, while others run to 2028. The North West includes work in Ngaka Modiri Molema, Dr Ruth Segomotsi Mompati and Rustenburg. In the Western Cape, projects target municipalities such as Mossel Bay, Overstrand, Saldanha Bay and Theewaterskloof.

These projects demonstrate both the scale of investment and the uneven capacity to complete them on time. ●



AFRICA'S NEW WATER NORMS AND STANDARDS AIM TO TIGHTEN COMPLIANCE AND ACCOUNTABILITY

The South African Department of Water and Sanitation (DWS) published its revised set of Compulsory National Water and Sanitation Services Standards in June 2025 and is set to take effect in April 2026.



Ayesha Laher, director of AHL Water

This is one of the most comprehensive updates to the country's water regulatory framework in nearly a decade.

Developed in line with the National Water Act, the amended standards are designed to address key risks and service challenges identified through the Water and Sanitation Indaba resolutions of 2023 and 2025. Speaking about the purpose of the revisions, Ayesha Laher, director of AHL Water, explains that these changes "reflect a maturing sector responding to a new set of pressures from infrastructure

decline to accountability and professionalisation."

Laher explains that DWS is empowered to develop and enforce norms and standards as the landscape changes, and the last revision was in 2017, making the current revision a timely intervention into a crucial sector.

Key prohibitions and compliance requirements

The revised framework establishes stricter compliance obligations for municipalities and Water Services Authorities (WSAs). All WSAs must submit plans for progressive compliance within six months of publication, outlining how they intend to meet each provision.

Among the most notable prohibitions is the complete ban on bucket toilets. Municipalities are also barred from approving new housing or bulk-user developments

Leaks must now be isolated within 4 hours of reporting; this could help reduce non-revenue water significantly

where wastewater treatment capacity is already exceeded.

"In simple terms, you can't connect new developments if your wastewater system cannot cope," Ayesha explains. "This is an important step to prevent overloading already failing treatment works."

Failure to issue advisory notices in the event of drinking water quality failures is now considered an offence under Section 28. Ayesha describes this as a potential turning point for accountability: "If a municipality fails to warn the public of unsafe drinking water, it can now be taken to court. Every water quality failure that goes unreported represents a risk to public health and now, a regulatory breach."

The new provisions also establish offences for the improper disposal of faecal sludge, requiring that all sludge be transported and treated at authorised facilities. Records of sludge movement and disposal are now



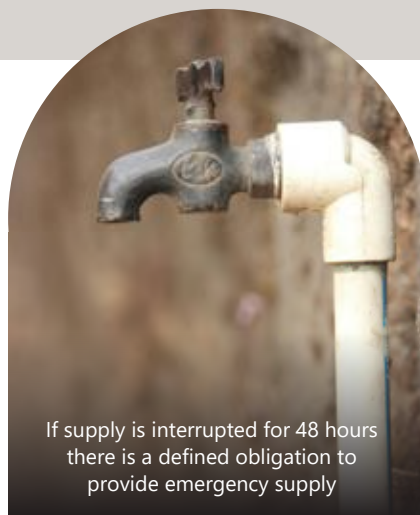
mandatory, part of a wider emphasis on faecal sludge management and environmental protection.

Service delivery and continuity

The new standards set minimum service levels for both water supply and sanitation access. Municipalities must ensure that residents have access to water for at least 358 days a year, with any interruption not exceeding 48 consecutive hours in duration. Where outages exceed this limit, authorities must provide a minimum of 15 litres of potable water per person per day through interim supply points or tanker systems.

"It's one of the most progressive elements," says Laher. "There's now a measurable threshold for service interruption, and if exceeded, there is a defined obligation to provide emergency supply."

Municipalities must also register and monitor tanker operations, including water sources, delivery volumes, and



If supply is interrupted for 48 hours there is a defined obligation to provide emergency supply

destinations, a move intended to counter corruption and inefficiency in emergency supply contracts.

A further addition requires that interim water and sanitation services be provided to any newly established informal settlement within 90 days of its identification. However, Laher acknowledges the complexity of this provision. "It's well-intentioned, but practically difficult. Infrastructure cannot realistically be built in 90 days,

especially where municipalities already lack capacity."

Water conservation, demand management, and leak response

The 2025 standards place strong emphasis on Water Conservation and Water Demand Management (WCWDM). Each municipality must develop a 10-year WCWDM strategy, supported by an annual plan uploaded to the Department's Integrated Regulatory Information System (IRIS).

Performance benchmarks are defined for the first time:

- Non-Revenue Water must be kept within 20–30%,
- Water losses between 10–20%,
- Infrastructure Leakage Index (ILI) between 2–4, and
- Per capita use between 120–180 litres per day.

Municipalities are required to isolate 95% of detected or reported pipe bursts within four hours and repair all leaks within 48 hours. "These are ambitious targets," Ayesha notes. "If

R32 billion investment potential in Western Cape's water sector

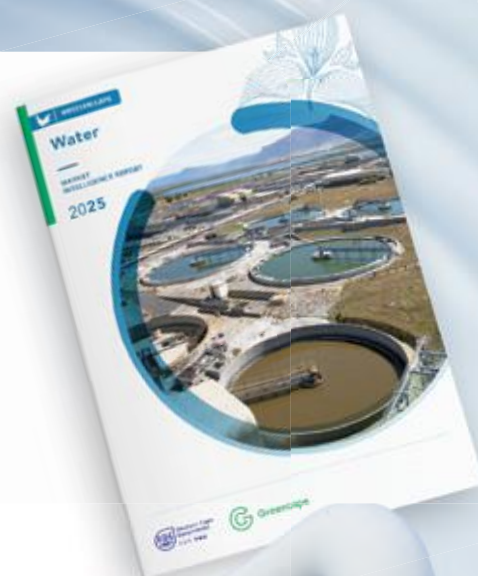
Market intelligence report highlights key investment opportunities in Western Cape's water sector

Localisation of manufacturing: R30 billion market potential for water value chain components for municipal water infrastructure projects.

Innovative financing models: R2 billion in external financing is required to support project preparation and development finance of municipal water projects.

Access the market intelligence report

Published by the Western Cape Government
Department of Environmental Affairs
and Development Planning (DEA & DP)
in partnership with GreenCape.



enforced, they could significantly reduce water loss but capacity and resources remain major barriers."

Professionalisation

A major outcome of the Water Indaba process has been the call for professionalisation of the water sector. The revised standards formalise this by setting out competency requirements for senior water and sanitation officials.

Heads of Water Services Authorities and key technical managers must now hold an engineering degree (BEng, BSc Eng or BTech) and be professionally registered with the Engineering Council of South Africa (ECSA). Category A municipalities require 15 years' post-qualification experience, and Category B and C municipalities require 10 years.

"This addresses the problem of unqualified political appointments in technical posts," Ayesha explains. "Professionalisation introduces accountability. If a registered engineer acts negligently, ECSA can withdraw their registration. That's a real consequence for non-compliance." While the DWS revision is vague on non-compliance in this area, Laher's scenario sees third-party enforcement. If the department cannot directly intervene, governing bodies like ECSA play a heightened role in compliance.

The new framework also aligns with Process Controller Regulations (GN 3630 of 2023), ensuring that staff operating treatment works are trained and certified.

Operational efficiency and sustainability

WSAs are now required to maintain comprehensive water and wastewater balance analyses, calibrate meters, and report results quarterly to the DWS. They must account for daily abstraction, inflows, outflows, and losses, using the International Water Association (IWA) water balance methodology.

Laher adds, "Every municipality must prepare a cost-reflective operations and maintenance budget per system, specifying costs per cubic metre of water supplied, including energy, chemicals, labour, and repairs."

The standards also require municipalities to secure alternative energy supplies for critical infrastructure, such as diesel generators or biogas systems, and to protect facilities against vandalism and theft.

Section 78 and the future of water service delivery

The revision coincides with ongoing Section 78 interventions under the Water Services Act, which allow the DWS to transfer water service functions away from failing municipalities to licensed external providers.

"We're already seeing the groundwork for this," Laher confirms. "Some provinces, like Mpumalanga, have started assessments to determine

which municipalities retain their water service authority status and which will hand functions to new water service providers."

These licensed providers will be required to meet the same regulatory and performance criteria, including compliance with the revised standards, and will receive direct transfers from Treasury for the provision of free basic water to indigent households. According to Laher, this "moves the power and duty from a failing municipal vendor to a private entity. If implemented correctly, this could improve service delivery, but it will also raise employment and governance challenges within municipalities." Laher offers possible scenarios as an example: "How will a new water service provider cope with a system that is failing dismally? This doesn't rectify the problem but passes it along to someone else who might be able to 'bring the system to life.' Another caveat is the labour challenge: what happens to staff and employees if their mandate is transferred to another water services provider?"

Ultimately, the revised norms and standards represent both a technical and governance shift. By embedding measurable performance targets and legal obligations, the DWS aims to create enforceable accountability across the water sector.

"It's a significant step towards rebuilding trust and functionality," Laher concludes. "The question now is not whether the framework is strong enough, it's whether enforcement will follow." ●



R32 BILLION INVESTMENT OPPORTUNITY IN WESTERN CAPE'S WATER SECTOR

The Western Cape Department of Environmental Affairs & Development Planning (DEA&DP) has published the 2025 regional water market intelligence report (MIR) identifying key developments in the water sector.

The key findings from the MIR's supports the Western Cape Government's vision of a green province where economic opportunities, a healthy natural environment and sustainable food production are not competing with one another but are complementing one another and stimulating growth," said Minister Anton Bredell, Western Cape Minister of Local Government, Environmental Affairs and Development Planning.

The report, developed in partnership with GreenCape, highlights the most promising investment opportunities in the water sector in the Western Cape.

Two key investment opportunities highlight the following:

1 Localisation of manufacturing

South African metropolitan municipalities are investing in water, wastewater treatment, sanitation, and stormwater infrastructure,

providing promising opportunities for businesses in these areas. The combined metropolitan municipalities planned water and sanitation infrastructure spend over the medium term (2024/2025 – 2026/27) is approximately R54.6 billion, of which R22.4 billion is planned by the City of Cape Town. Collectively, the other Western Cape local municipalities are planning to invest ~R7.7 billion in water infrastructure over the same period.

The water value chain components which present the biggest opportunities for localisation are mechanical hardware relating to wastewater treatment works and pumps. Opportunities for the plastic pipe market (HDPE pipes) will also be further unlocked within the next 10 years as municipalities are now in the position to replace their water distribution systems due to the current asbestos pipes reaching end-of-life.

2 Innovative financing models

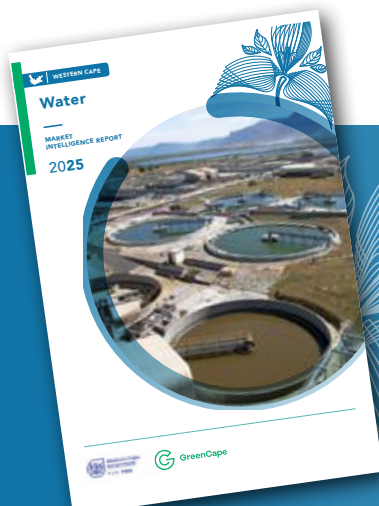
The Water Services Infrastructure Grant (WSIG) and Regional Bulk Infrastructure

Grant (RBIG) allocations to local municipalities in the Western Cape over the next three years is expected to be well below R2 billion. Municipalities that have not built up a substantial capital reserve to fund projects will rely on external loans for project implementation.

There is an increase in project preparation support and available development finance linked to impact and sustainable development goals. These programmes include the Sustainable Infrastructure Development and Financial Facility (SIDAFF) and the Water Partnerships Office (WPO), both aiming to assist municipalities in building a pipeline of bankable projects.

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GROUNDWATER DOESN'T AGE LIKE FINE WINE

In hydrogeology, 'groundwater age' refers to the time since water infiltrated the subsurface. While conceptually useful, its interpretation in fractured or heterogeneous aquifers is complex, as mixing, dispersion, and variable flow paths can obscure the true residence time and challenge straightforward age estimations. **By Yazeed van Wyk, research manager, Water Research Commission**



Unlike a sealed bottle of wine, which follows a relatively predictable chemical evolution under controlled conditions, groundwater in fractured aquifers does not 'age' uniformly. Some water flows quickly through open fractures, while other portions linger in tiny rock pores for decades or centuries. As a result, a water sample from a borehole is rarely of one single age, but rather a blend of waters of many different ages.

Water flows through fractures and rock pores at variable rates, mixes continuously, and interacts chemically with the surrounding environment, making its residence times highly variable and far less predictable. A useful way to think about this is like a shopping mall. The age of one shopper is the time they personally have spent inside since they entered. The mean residence time, however, is the average time that all shoppers spend in the mall. In groundwater, tracers such as carbon-14 can give us an apparent age of a water sample but because samples are mixtures, the apparent age is often closer to the mean residence time of that mixed water, rather than the true age of a single parcel. In such settings, the 'age' of groundwater

is not a fixed value but better described as a distribution of residence times, of which the mean residence time is just one summary statistic. Recognising this variability is critical for accurate interpretation of tracer-based estimates and for the development of realistic conceptual and numerical models.

This nuance is important in a country like South Africa, where fractured aquifers dominate, and groundwater remains a vital resource for both urban and rural populations. While isotope and tracer-based methods have become increasingly valuable tools for improving hydrogeological conceptual models, there are inherent limitations in oversimplifying age interpretations. Discussions at the IAEA technical working group on environmental tracers, held in Vienna, Austria in April 2025, reinforced the growing consensus that mean residence times, full age distributions, and multi-tracer approaches provide more scientifically sound and informative insights than relying on just single age estimates alone.

For example, short-lived tracers such as ^{35}S and ^{222}Rn are increasingly used to delineate recent recharge and shallow flow paths, while noble gases (CFCs, SF_6 , $^3\text{H}/^3\text{He}$)

are employed to estimate apparent ages of younger groundwater components. These tracers operate under fundamentally different assumptions. Radio-sulphur isotopes such as ^{35}S , produced via cosmic ray spallation of atmospheric argon, rapidly oxidize to sulphate and enter the water cycle via meteoric precipitation. Their relatively short half-life (87.4 days) makes them useful for identifying recharge events on seasonal to sub-annual scales. In contrast, gas tracers such as $^3\text{H}/^3\text{He}$ only start the isotopic clock once water passes below the water table, thus missing residence times in the vadose zone where important biogeochemical processes occur. This is a critical point also raised during the Vienna meeting. Groundwater age, if interpreted solely from gas chronometers, does not capture the temporal domain of infiltration and vadose zone transport. For fractured-rock aquifers, where flow is often governed by both matrix diffusion and fracture advection, the vadose zone may represent a significant portion of the total transit time. Hence, combining isotopes that reflect vadose zone processes (stable water isotopes, ^{35}S) with those that reflect saturated zone residence (SF_6 , CFCs) yields a more complete hydrochronological profile.

Fieldwork

Fieldwork conducted at a now decommissioned quarry near Pretoria reinforced these insights. Environmental tracers, including stable isotopes (such as Deuterium, ^2H and Oxygen-18, ^{18}O) and the radioactive isotope Tritium (^3H), were applied to investigate recharge processes and groundwater flow dynamics. The stable isotopes provided information on recharge elevation and seasonality, while the presence of tritium (^3H) indicated the presence of modern water within



the system. Combined, these tracers constrained mean residence times and highlighted the mixing of recent recharge with older groundwater components, a common feature in fractured quartzite aquifers.

In the broader tracer literature, additional tools such as artificial tracers (fluorescein, rhodamine WT), noble gases, and short-lived radionuclides (^{222}Rn , ^{226}Ra , $^{224}\text{Ra}/^{223}\text{Ra}$ ratios) have been used to delineate fracture-dominated flow and quantify residence times on the order of days to weeks. These approaches are particularly relevant in dynamic environments such as coastal lagoons or managed aquifer recharge systems, where short-term flushing and discharge processes dominate. The concept of an 'endmember' representing the unmixed, original groundwater signature prior to dilution or mixing is also critical in such studies. Yet even defining a representative endmember is non-trivial, as an equilibrium between aquifer material and infiltrating water is not always reached, especially for sorbing tracers like radium. The time to reach equilibrium is strongly influenced by the distribution coefficient (K_d) and isotope half-life, ranging from minutes to days for ^{224}Ra ($t_{1/2} = 3.63$ days) and ^{223}Ra ($t_{1/2} = 11.43$ days), to years for ^{228}Ra ($t_{1/2} = 5.75$ years), and up to millennia for ^{226}Ra ($t_{1/2} = 1600$ years). These can be converted into approximate flow distances based on groundwater velocity assumptions.

Impacts

For communities in rural areas or small towns in the Karoo, knowing whether borehole water is 'young' or 'old' can mean the difference between safe drinking water and contamination risk. This is why, from a South African management perspective, these scientific insights carry real urgency.

Fractured-rock aquifers, which supply much of the country's water, are often assumed to be naturally protected by depth or by long mean residence times. Yet environmental tracer evidence shows that rapid preferential flow paths can deliver 'young' recharge water through fractures and faults into supposedly well-protected aquifers. This means that even boreholes yielding predominantly 'old' water may still be vulnerable to recent surface

contamination if a small fraction of young water is present.

With pressures from urbanisation, agriculture, and climate variability mounting, these dynamics can no longer be ignored. Effective groundwater management must therefore go beyond bulk averages and explicitly account for the youngest fractions of water, which act as sentinels of vulnerability. This requires clearer science communication. Terms such as 'groundwater age' must be unpacked, and mean residence time framed as a statistical simplification of a much broader distribution of travel times. What is urgently needed is the routine application of multi-tracer frameworks, tailored to site-specific conditions, that capture the full range of transit times, geochemical interactions, and hydrological domains traversed by groundwater. The Vienna technical meeting strongly advocated for this integrative approach, and adopting it in South Africa would provide a more realistic foundation for recharge protection strategies, contamination risk assessment, and long-term water security.

Finally, building global inclusivity in tracer research is critical. The Global South, despite bearing a disproportionately high share of groundwater dependence, remains underrepresented in method development and capacity building. Platforms like the IAEA meeting play a key role in sharing data, harmonising protocols, and fostering collaborative learning.

In conclusion, as highlighted throughout this article, groundwater does not 'age' like fine wine it flows, mixes, and evolves in response to geological, climatic, and anthropogenic drivers. In South Africa, where fractured-rock aquifers supply much of the population's water, these dynamics have immediate implications for recharge protection, contamination risk, and sustainable water management. Scientific tools and approaches must reflect this complexity. By embracing multi-tracer methods, refining conceptual models, and communicating findings clearly, groundwater assessments can become not only more accurate but also better aligned with the practical challenges of managing South Africa's vital water resources. ●

Legal groundwater use could ease South Africa's growing water stress

With droughts, floods, and ageing infrastructure straining supply, safeguarding South Africa's water resources is critical. The Borehole Water Association (BWA) says responsibly drilled and managed boreholes are vital to easing the nation's ongoing water crisis by providing reliable, sustainable access amid worsening climate and infrastructure challenges.

"Illegally tapping into municipal water supplies puts additional pressure on already strained systems," says BWA president, Derek Whitfield. "The recent commencement of the drilling of boreholes in nine informal settlements in Gauteng," he notes, "recognises the need to simultaneously provide water to growing communities, especially areas where infrastructure development has not reached these communities or has not been maintained for decades."

Accessing water via properly constructed boreholes – which could be supported by new storage tanks, reticulation and standpipes – means that communities have a safe and sustainable source of water and no longer need to rely on illegal connections. Responsible Borehole drilling is a legal and safe way to ensure the responsible access to and use of valuable water resources.

Albertus Lombaard, BWA Exco member and special advisor on drilling, emphasises the importance of compliant borehole drilling in ensuring the protection of our natural aquifers and in the prevention of ground water contamination. "More than 80% of South Africa's towns depend on groundwater as their primary source of safe potable water. This situation emphasises the need in our country of more trained and certified borehole contractors," he says. "Borehole drilling is a critical skill in the context of South Africa's water situation, providing responsible access to our groundwater resources." ●

From left Albertus Lombaard, exco member, Borehole Water Association (BWA) and Derek Whitfield, president, Borehole Water Association (BWA)



DISINFECTION SENSORS

for clean and safe water

Water is essential for all life and plays a critical role across various industries and their processes. In Southern Africa's water and wastewater sector, effective disinfection is key to ensuring drinking water is safe for communities and treated wastewater complies with regulatory standards, protecting both public health and the environment. **By Terene Govender, junior water and wastewater industry developer, Endress+Hauser**

Effective disinfection methods translate to safe drinking water and wastewater compliant with regulatory standards. Monitoring disinfectant levels is vital to ensuring proper disinfection, and Endress+Hauser's range of disinfection sensors is designed to monitor and control disinfectant levels in the treatment process. These sensors can detect and measure disinfectants like chlorine, total chlorine, free chlorine, ozone and bromine. As the disinfection process becomes increasingly important, the correct sensor is imperative.

Endress+Hauser's range of sensors

- Endress+Hauser's disinfection sensors are equipped with Memosens 2.0, enabling highly accurate digital data transmission. The raw measured values are converted into digital signals and transmitted. This eliminates issues previously associated with analogue signal transmissions, such as interference and signal loss.
- With the Memosens Technology, these sensors are also 'plug-and-play'. The sensors are delivered pre-calibrated from the factory and can be easily



ENDRESS + HAUSER DISINFECTION SENSORS

- Memosens CCS50E for Chlorine Dioxide – Commonly used in the drinking water network, process water, utilities and reverse osmosis plants
- Memosens CCS51E for Free Chlorine – Used in the drinking water network, process water, utilities and swimming pools
- Memosens CCS53E for Total Chlorine – Process water and wastewater treatment plants
- Memosens CCS55E for Free Bromine – Water desalination plants, swimming pools, thermal baths, process water, marine applications and fish farming
- Memosens CCS58E – Water treatment process, wastewater, process water and in pipes.



connected and commissioned to ensure that the setup is performed seamlessly.

- Endress+Hauser disinfection sensors respond quickly, ensuring swift reactions to changes in processes and more efficient process control.
- These sensors also store data, including calibration information, simplifying maintenance and prolonging calibration intervals.
- Reagents are not required for operation, thus reducing the overall operating and maintenance costs.
- The disinfection sensors are designed to operate in harsh environments, including high humidity, extreme temperatures and under aggressive chemical conditions.

Applications in the water and wastewater industry

The Memosens CCS51E is an ideal sensor for municipal applications. This sensor is designed to monitor chlorine levels in drinking water, ensuring that chlorine



Efficient and accurate monitoring is vital



Wastewater treatment plants have strict regulatory requirements

levels are within regulatory requirements. This process is monitored, with a high degree of accuracy, for any deviation, enabling corrective action.

Wastewater treatment plants have strict regulatory requirements. The Memosens CCS58E ozone sensor monitors the ozone levels in the wastewater treatment process. It provides accurate real-time data; optimising disinfection and reducing chemical use, which in turn lessens environmental impact.

With an ever-increasing focus on sustainability, industrial water

reuse has become a critical practice. Endress+Hauser disinfection sensors can be used in industrial water plants to monitor and control the quality of reused water. Ensuring accurate disinfectant measurements that meet the required standards supports sustainable water management practices. Industrial plants can optimise their water reuse processes, reduce chemical input, and ensure a safe water supply. This is particularly important in industries such as food and beverage plants, where the quality of water is critical to product safety and quality.

As the demand for high-quality water continues to grow, the need for effective disinfection processes cannot be ignored. Endress+Hauser's disinfection sensors can be relied upon to provide accurate, cost-effective solutions for monitoring disinfection levels. Endress+Hauser is committed to ensuring excellence in measurement processes and disinfection practices, thus ensuring the water and wastewater industries are able to meet their disinfection needs and to ensure a sustainable and safe water supply for future generations to come. ●

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FITTED FOR THE FIELD: DIFFERENTIAL PRESSURE MEASUREMENT MADE SIMPLE



Complex water systems depend on accurate measurement to function effectively. One reliable method is differential pressure sensing, which measures the difference in pressure between two specific points within the system.

Differential pressure sensors employ a metallic measuring cell at their core, which provides several significant advantages. These sensors are particularly well-suited for applications that require managing high static pressures and detecting minimal pressure differences.

They are generally compact, and the design allows for efficient integration into complex systems, while their robust construction ensures high measurement accuracy. This makes them a reliable choice for environments where precision is paramount, and even the slightest pressure variations must be captured and monitored.

A notable example within this category is the use of chemical seals, such as the CSB (both high and low pressure points) and CSS (one-sided, either low or high-pressure) variants. Chemical seals are designed for universal application across scenarios involving large pressure differences and high static pressures. Their design typically incorporates an integrated overload diaphragm, which significantly enhances operational reliability by protecting the sensor from damage due to unexpected pressure surges. This feature is especially valuable in industrial settings where process conditions can vary unpredictably and equipment durability is essential for continuous operation.

The VEGADIF 85 is a differential pressure sensor that combines universal applicability with high operational dependability and integrated overload protection. It ensures consistent performance even in the harshest conditions, safeguarding both the measuring cell and the integrity of the readings produced.

Electronic differential pressure measurement has introduced a new level of versatility and ease of use in modern process industries. These systems typically employ two pressure transmitters, often from the VEGABAR PRO series, which are combined to form a comprehensive measurement system. One of the primary advantages of electronic differential pressure systems is their immunity to environmental factors, such as fluctuations in ambient temperature, which can otherwise compromise measurement accuracy. Additionally, electronic

systems offer flexibility, allowing for the use of various sensor configurations and measuring cells tailored to specific applications.

The installation, assembly, and ongoing maintenance of electronic differential pressure systems are notably straightforward, minimising operational downtime and reducing overall life cycle costs. In practical terms, these systems can be used for applications such as monitoring pressure overlays in vessels, where sensors from the VEGABAR 80 series are seamlessly combined. This modularity allows users to address challenges such as large temperature differences, vacuum conditions, abrasive media and the need for cost-efficient solutions with minimal installation complexity. ●

Differential pressure systems measure pressure differences between two points



COLLABORATION IS REQUIRED TO SOLVE SOUTH AFRICA'S WASTEWATER CHALLENGES

South Africa is experiencing a rise in wastewater issues across the country. Both the national and local governments need technical and practical solutions to help solve these ongoing challenges.



Hugo du Plessis, KSB Pumps and Valves market area manager for water, wastewater and irrigation

In an effort to assist, KSB Pumps and Valves have consulted its skills base to work with local wastewater service providers in finding innovative solutions for projects of all sizes, from national to municipal and even smaller case-by-case mini projects.

Hugo du Plessis, KSB Pumps and Valves market area manager for water, wastewater and irrigation, explains, "We understand the challenges our municipalities face, and as a result, we are bringing all our expertise, local and international, to the table. Allowing us to assist on wastewater projects no matter the size or complexity, from small schools to large industrial areas and entire cities."

He elaborates further, "As a result of challenges at the grassroots level, we have even identified a strong need to upgrade one of our products from our wastewater portfolio and are almost ready to introduce this new locally developed wastewater pump that will be revealed to the market in the next month or two and will be a game-changer for wastewater plants."

Innovations

Speaking to the need for innovation while addressing the South African landscape, Du Plessis adds, "This innovation, combined with advanced technical services and a wide array of products, is part of our renewed drive to help address wastewater issues in conjunction with municipalities in the country. We also remain mindful of budgetary constraints and have worked within these limits to provide products and services that are cost-effective, versatile and reliable. At the same time, we have sourced other suitable solutions from across the globe that have been

added to our local arsenal. Now, our next step is to work with consulting engineers and end users from various regions from the inception of their projects to ensure pump stations and treatment plants are designed to work effectively for at least the next 20–30 years."

KSB Pumps and Valves are leveraging their expertise to aid all aspects of wastewater handling, from the physical requirements, suction conditions at pump stations, and specialised equipment such as submersible pumps, mixers and flow makers. KSB's product line adheres to the stringent global standards of quality, ensuring longevity, which is a priority for the South African market.

Du Plessis adds, "We are committed to working with government agencies, municipalities, and engineers to provide reliable technical consultation, training, and collaboration. In the coming months, we are bringing new products that are designed and manufactured locally for local conditions, while using our global operations in suitable local contexts." ●



Pumps should be robust and reliable to meet the needs of the South African market



South Africa's wastewater challenges require collaboration to overcome

KSB Pumps and Valves is leveraging its global and local expertise to work with the South African water sector including local and nation government





Non-compliant water meters **ARE BLEEDING SOUTH AFRICA DRY**

South Africa's water meters are governed by the Legal Metrology Act 9 of 2014, which is gazetted, binding, and leaves no room for ambiguity. Yet, illegal meters continue to flood tenders and municipal networks, draining billions through non-revenue water. The problem isn't lack of awareness – it's lack of enforcement. **By Bevan Davis, MD, Conver-Tek and Davis & Deale**

Every year, South Africa loses an estimated R7,2 billion to non-revenue water. (NRW). A significant share of this loss comes down to aging infrastructure, non-compliant water meters, and non-compliant specifications, that are wantonly bypassed and accepted by some municipalities and metros.

These devices are not only inaccurate – often underreading and masking real consumption – but also undermine the entire water system. They cannot be repaired, integrated, or trusted. Still, they are being purchased and installed under the noses of regulators, and some councils.

The law is clear. All meters must comply with SANS 1529 under the NRCS (National Regulator for Compulsory Specifications) legal metrology framework. Compliance lists exist on the NRCS and Jaswics databases. The few companies playing

by the rules have invested millions to meet these standards. Yet they are being undercut by operators who import cheap, illegal, non-compliant products, sell them out of trading garage companies and even online, while faced with no consequences.

By law, every single domestic water meter must be NRCS-approved, tested in a certified and designated laboratory, be digitally traceable, and have its own unique, serialised test certificate, stating when it was tested, on which test bench, and by which verification officer. These details have to be sent to the authorities on a monthly basis for audit and verification purposes. If rigid standard operating procedures and specifications are not implemented and policed, quality will soon be non-existent, and our appalling level of non-revenue water will simply increase. We cannot afford to waste even one litre of non-revenue water. If the performance of a water

meter is questioned by the user, or water authority, it must be possible to trace it back to the supplier, and access the compliance certificate and auditable data. This information must be in place to prove compliance before a meter can legally be sold. Unfortunately, this process is only being implemented by the compliant companies. Costly laboratories and skilled personnel add to legitimate operators' expenses – costs that illegal traders sidestep to undercut prices in the local market. This is compounded by the dubious materials and practices often used to manufacture non-compliant water meters.

The failure of policing

SALGA and the NRCS have sounded the alarm. They've hosted seminars. They've explained the law. But what good is awareness if nothing is enforced? What is the value of gazetted legislation if it is treated as optional, buried in red tape, and



lost in finger-pointing, with no real accountability?

The truth is this: compliance is being carried out only by those willing to absorb crippling costs, while others exploit loopholes, corruption, and weak policing. Some municipal tenders list illegal devices, approvals get rubber-stamped, and compliant companies are left to compete with non-compliant traders, masquerading as suppliers.

To enforce compliance, the few legitimate companies are dragged into slow, costly legal battles against non-compliant suppliers, metros, and councils. Adding insult, metros fund their defence with ratepayers' money. Meanwhile, rogue traders exploit loopholes and weak policing. This is unsustainable.

Compliance in question

Water meters fall under the NRCS legal metrology framework and must comply with SANS 1529. But critical questions remain unanswered: when were all the so-called 'compliant' companies last tested independently against SANS 1529? Who actually complies today? Where are the checks and balances to ensure only legitimate and compliant companies are legally permitted to trade?

Legitimate companies have willingly opened their doors for audits and inspections, but lack of access to test procedures, audit records, and procedures from illegal operators and traders carries on relentlessly. This lack of transparency means the industry cannot verify compliance across the board. Unless the system is fully integrated, transparent, independently monitored and audited, true compliance will remain in doubt. The excuses of budget and manpower restraints by government simply encourages illegal, non-conforming operators to continue to exploit the loopholes, and profit accordingly.

Local industry under siege

The South African Metering Industry Association (SAMIA) fought to localise production – winning a 2017 policy target of 40% residential meters produced locally. The goal was to encourage local manufacturing, create jobs, strengthen accountability, and keep compliance under control. This

has been challenged, and has simply opened the doors to many cheap imported meters from China, as compliance, although a pre-requisite, is being ignored, or bypassed.

But how can local industry survive when illegal, non-conforming imports are traded, and allowed to slip in unchecked? Why invest millions in SABS-certified test equipment, SANAS-accredited labs, management, and employee training, when rogue operators face no audits, no prosecutions, and no consequences? It is no wonder that some major corporations are threatening to close their meter divisions altogether. Once the legal metrology framework collapses, our water industry and support infrastructure will finally implode. Next to rates, taxes, and electricity, water is the biggest income for councils, and should non-complaint companies continue to trade, this will have dire consequences for the fiscus.

The way forward

This is not a technical debate. It is a matter of law. The Legal Metrology Act is gazetted. Section 17 and SANS 1529 spell out municipal responsibility. Certificates of conformity must be checked. Non-compliant devices are illegal and may not be sold or used.

The solution is simple: enforce the laws, prosecute the offenders, and hold municipalities accountable for knowingly installing illegal meters. Without swift, visible action, our already fragile water and sewerage systems will edge closer to collapse.

The message is clear: compliance is non-negotiable. South Africa doesn't need more meetings, seminars, databases, or polite reminders. It must enforce gazetted laws that are policed, and offenders prosecuted. Until illegal, non-conforming operators are shut down and municipalities are forced to comply, the country will continue to hemorrhage billions, the water infrastructure will collapse – and local manufacturers will either close, or disinvest, causing job losses. Then the illegal, non-conforming operators and traders will prosper at the expense of every water user, as well as local industry and the South African economy. ●

Meters manufactured by Davis & Deale and Conver-Tek



REAL-TIME VISIBILITY TO REBUILD SOUTH AFRICA'S WATER FUTURE



Founded in 2019, IOTDC has already made its mark in the telecoms and mining sectors. Now, the company is turning its expertise toward South Africa's water crisis, offering municipalities real-time visibility of their networks to curb losses and recover revenue.

“IOTDC was started to bring best-of-breed IoT solutions to the South African market,” says Tiaan Coetsee, CEO and co-founder of IOTDC. “We initially found success in the telco space, but soon expanded into mining and utilities. Entering the water sector was a natural step for us – the water sector is facing critical challenges that affects every citizen in the country.”

South Africa's water scarcity, compounded by decades of under-investment in preventative maintenance,

has left municipalities struggling with leaks, theft, inaccurate metering and outdated systems.

According to Coetsee, IOTDC saw the chance to apply its technology to make an impact. “We wanted to bring a solution that helps municipalities and metros gain visibility of their metering points, understand what is happening in real time, identify leaks or illegal connections, and act on them. Crucially, our solution enhances revenue recovery so municipalities can start investing in maintenance and infrastructure development. The system becomes self-funding over time—the more leaks are addressed, the more revenue can be collected and reinvested.”

Smart metering and integration

Non-revenue water (NRW) remains one of the biggest threats to water security. “A lack of centralised visibility plays a big role,” Coetsee says. “Although

municipalities have systems in place to track supply, pressure, and metered consumption, these are often outdated and operate in silos. In some cases, they're still using old mechanical meters, which are inaccurate and require manual reading. Often, municipalities rely on incoming complaints or calls from communities and then dispatch teams to fix the issue in that specific location. We believe in a much more proactive approach.”

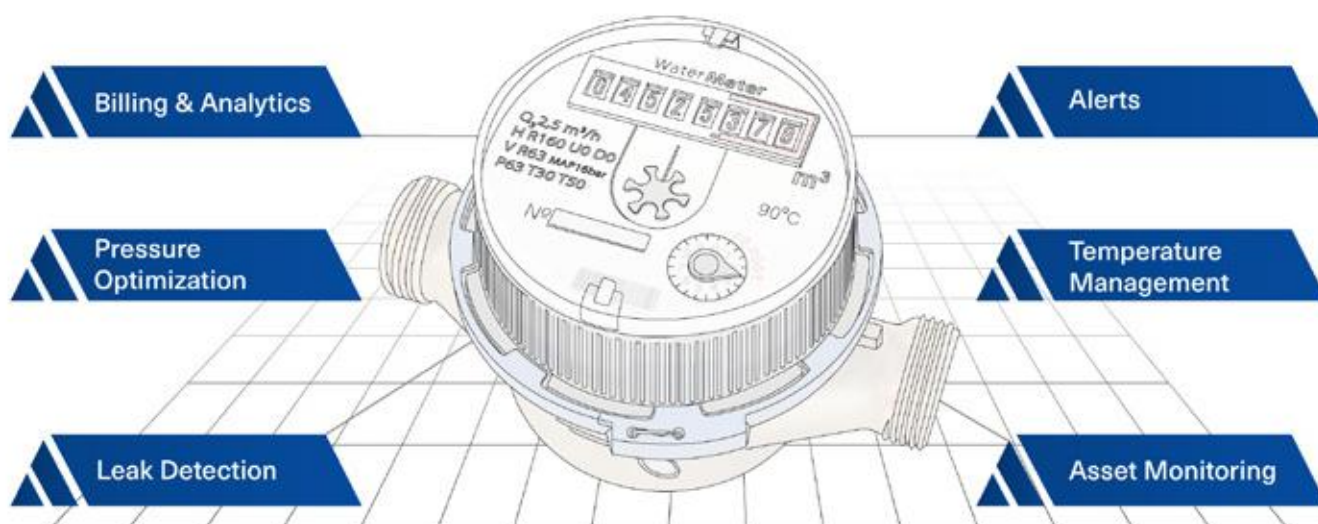
IOTDC's approach to NRW is multi-layered, covering smart metering, AI-driven leak detection and robust data management. The company partners with leading meter manufacturers rather than producing its own hardware.

Because different meter manufacturers use varying wireless communication technologies (such as LoRaWAN, NB-IoT, Sigfox, Wireless M-Bus) and protocols (such as MQTT, COAP and DLMS), it is crucial for clients to unify the data collected from their metering points.

“Our software platform is meter and protocol agnostic, which means we can integrate with any meter provider or backend system. We use Davra, a world-class IIoT enablement platform, which allows us to unify data from different devices and protocols. From there, we apply AI and analytics to deliver actionable insights,” states Coetsee.



Tiaan Coetsee, CEO and co-founder of IOTDC



Another breakthrough is AI-enabled acoustic leak detection. “Acoustic sensors listen for leaks at the meter point, helping utilities pinpoint problems between two points. It works particularly well in residential areas,” he notes.

Unlike traditional mechanical meters, new static smart meters use ultrasonic sensors and other detection technologies. This extends their lifespan from five to around 15 years while ensuring accuracy and reducing maintenance. “There’s also built-in protection—intelligent alarms flag tampering and theft attempts,” Coetsee adds.

Connectivity challenges in rural areas are also addressed with smart meters through IoT protocols such as LoRaWAN and Sigfox. “With LoRaWAN, for example, one base station can cover 15–30 km, making it affordable and easy to deploy in areas where cellular coverage is limited.”

Capacity building and change management

For municipalities, adopting new technology can be daunting – especially given limited skills. “We provide

extensive training for users during the implementation phase of a project, with the goal of equipping them to operate the system effectively once deployment is complete,” Coetsee says. “Where resources are stretched, we also offer service level agreements. Ultimately, it’s their business; we just provide the technology to run it better.”

He cautions, however, that technology alone won’t solve systemic problems. “The best technology in the world cannot fix a broken business process. Implementing new technology – particularly at the scale required by public entities – inevitably comes with challenges. One of the most common pitfalls is failing to establish a clear, transparent business case with realistic and measurable return on investment. From the outset, it must be clear how much money the technology will save or generate, and which efficiency metrics it will improve. Both the client and the technology partner must remain accountable to these outcomes, with all stakeholders held to the same standard to secure and maintain buy-in. Unfortunately, South Africa has many examples where this critical step was overlooked.”

Equally important is robust change management and training, so users feel confident and supported in adopting new ways of working. Resistance from staff is inevitable when routines are disrupted, making it essential for senior management to frame innovation positively and secure buy-in. Ultimately, municipalities must equip their teams with the skills and resources needed to operate the technology effectively and sustainably.

The technology has already proven itself in Europe, with deployments in France, Denmark, Finland and Ireland. Locally, IOTDC is running Proof of Value projects in several South African municipalities as the first step toward full-scale rollouts.

Looking ahead

For Coetsee, what excites him most about IOTDC is the culture. “We’re a young, vibrant and innovative business that is busy changing the game. With the right partners and skills, we are well positioned to deliver best-practice IoT solutions and make a tangible difference in the markets we serve – especially in water, where the need could not be greater.” ●



A case study developed by GreenCape in partnership with the Western Cape Department of Environmental Affairs and Development Planning

BUILDING WATER RESILIENCE IN THE HEALTH SECTOR

Mediclinic Southern Africa (MCSA) is a private healthcare group that operates 47 hospitals in South Africa and three in Namibia. Water scarcity remains one of the biggest challenges within the healthcare industry, and can have adverse implications by causing job losses, infection, or even loss of life.



Water shortages can bring many critical operations in a hospital to a halt, from laundry services, and equipment sterilisation in operating theatres, to routine cleaning. If sufficient measures are not taken in the event of an unexpected shortfall of water, hospitals risk creating an environment conducive to the spread of infections due to unclean linen and equipment.

In response to this, MCSA used innovative green technologies to ensure

operational continuity under challenging conditions caused by water scarcity.

Laundry facilities

Laundry facilities in hospitals are water-intensive due to the large volumes of linen that need to be frequently washed to curb the spread of infectious diseases. It is a challenge to recycle wastewater from the laundries because of the chemicals that are used to remove stains.

However, MCSA devised a water reduction strategy and found a way

to build a recycling plant to recycle wastewater produced by the laundries. The laundry project started in 2022 with a pilot in Panorama Hospital, where all the laundry facilities were connected to a recycling plant. The plant recycled 75% back to the laundries and 25% that could not be recycled was used as greywater for toilets. Once the concept was successfully demonstrated, it was rolled out to other MCSA hospitals across the country.

The recycling plants cost roughly R1.2 million each, and Cape Gate Hospital

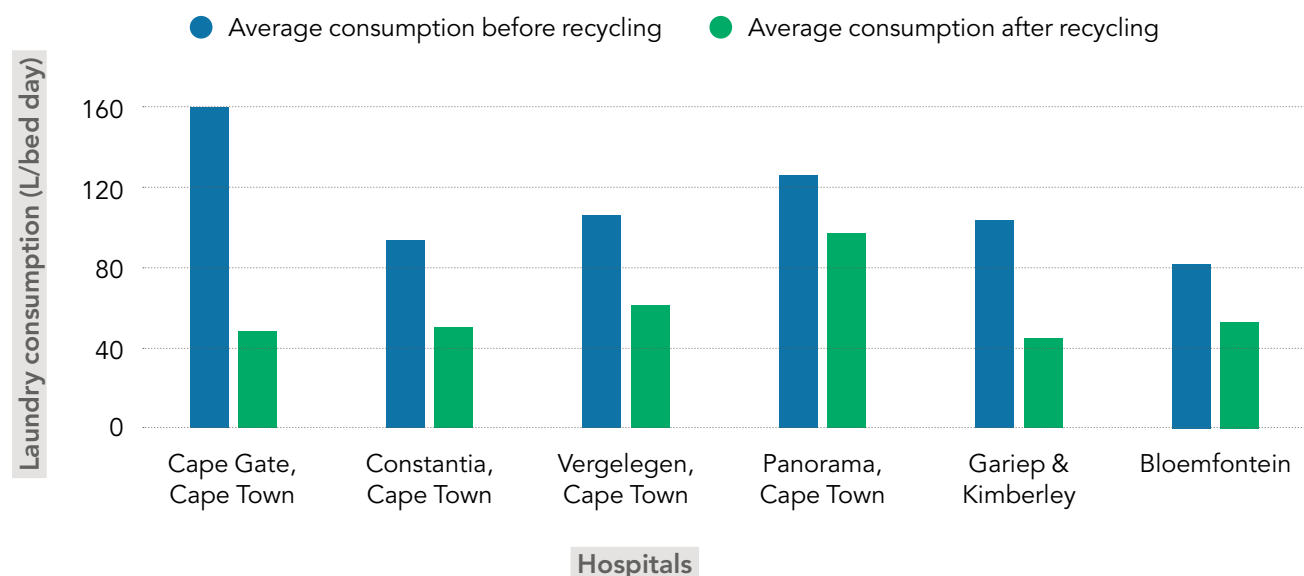


FIGURE 1 depicts how water consumption was reduced in laundries after recycling plants were installed in six different hospitals in 2024. The average water consumption before and after recycling is shown, the biggest reduction in water consumption was realised at Cape Gate Hospital (70%), followed by Gariep+Kimberley (56%) and Constantia (46%)



TABLE 1 The yearly estimated savings in Rands for 2024 were thus calculated. The Cape Gate Hospital, Bloemfontein, and Gariep+Kimberley were top in savings having saved R414 015, R271 934, and R244 794, respectively. For all six hospitals, the total estimated saving was R1 489 044

HOSPITALS	AVERAGE WATER SAVED (%)	AVERAGE MONTHLY WATER SAVED (KL)	AVERAGE MONTHLY SAVINGS	ESTIMATED AVERAGE YEARLY SAVINGS
Cape Gate, Cape Town	70	451	R34 501	R414 015
Constantia, Cape Town	46	195	R14 922	R179 064
Vergelegen, Cape Town	42	195	R14 922	R179 061
Panorama, Cape Town	23	218	R16 681	R200 176
Gariep & Kimberley	56	266	R20 400	R244 794
Bloemfontein	54	296	R22 661	R271 934
Assumed average cost per kilolitre of water: R76.57			Total	R1 489 044

achieved the largest savings, reducing water consumption by 70% with a payback period of an estimated 3 years.

Additional water management initiatives

- Water consumption thresholds are set for all hospitals to abide by and smart meters are installed at strategic positions to measure consumption.

- A Supervisory Control and Data Acquisition (SCADA) system is used to monitor the consumption and daily reports are produced for hospitals to see if they are within the threshold.
- Water used by autoclaves in theatres is recycled.
- There is an experimentation with ozone as a substitute for the chemicals used in laundries to improve the recycling process.
- There are boreholes at some hospitals to augment the municipal water supply. They are looking into recycling sewage water to use for toilet flushing.

to achieve when a sustainability project is being implemented.

In order to build resilience, hospitals should be forward thinking and invest in sustainable practices early, not as a response to a shock, which is often too late.

Water-saving interventions have economic benefits, and the financial savings can often quickly offset the upfront capital costs associated with water-saving technologies. ●

Insights and lessons learned

Building water resilience is a systematic journey that progresses from the easiest, least expensive initiatives, such as awareness raising, smart metering, and monitoring, towards more complicated, cost-intensive solutions.

For any business, it is important to tailor solutions for each facility, educate staff on sustainability goals, and invest proactively in green technologies. There is no 'one size fits all' solution. A solution that works in hospital A does not guarantee that it will work in hospital B. It is of paramount importance to educate the users about what is it that one is trying



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New raw water pricing strategy:

BALANCING COST RECOVERY WITH HUMAN RIGHTS

South Africa's raw water pricing strategy marks a bold step toward balancing financial sustainability with social equity. By aligning cost recovery with the right to water, the Department of Water and Sanitation (DWS) aims to build a transparent system that funds infrastructure, protects resources and secures the nation's water future.



municipalities or water boards, which were governed by the Water Services Act and fall under different regulatory frameworks. As tariffs are not regulated like in the energy sector, he emphasises the importance of an independent economic regulator to ensure a fairer water system in South Africa.

Deputy Minister of Water and Sanitation, David Mahlobo, says, "The revised raw water pricing strategy is a critical policy tool underpinning the financial and ecological sustainability of South Africa's water sector. These charges were designed to fund water resource management, conservation and infrastructure, and to support the equitable and sustainable allocation of water across all sectors." He also emphasises the legal framework that allows the Department to implement such changes, particularly Chapter 5 of the National Water Act (NWA Act No. 36 of 1998), Sections 56 to 60, which empower the Minister to establish a pricing strategy to guide the setting of water use charges.

The revised pricing policy situates itself among broader national goals and plans, specifically the National Development Plan 2030, as well as pointed reforms within the DWS, such as the establishment of an independent economic regulator. This is, as Mahlobo says, "Intended to address long-standing concerns about transparency, consistency and accountability."

Dr Sean Phillips, director-general of DWS, contextualises the revised plans, saying, "Water is a monopoly service, so pricing is a critical issue for ensuring financial sustainability. The raw water pricing strategy, as required under the National Water Act, provides the framework for setting water use charges on raw water abstracted from rivers, dams, and other sources." He clarifies that the strategy does not cover the tariffs charged by

Key revisions

Sizani Moshidi, Director in the Department responsible for the raw water pricing strategy, makes note that the raw water pricing strategy "specifically covers raw water abstracted from government infrastructure (such as dams and canals), and not water supplied through municipal services, which the Water Services Act governs."



David Mahlobo, Deputy Minister of Water and Sanitation



Dr Sean Phillips, director-general of DWS

Moshidi, Phillips, and Mahlobo all point to the user-pays and polluter-pays principles as the guiding philosophy of the pricing.

The changes to pricing come with changes to water use categories, where DWS initially categorised water use under domestic and industrial. This category was split into three distinct water use cases: municipal, industrial (including mining), and strategic users.

- Municipalities account for 27% of all water used in South Africa
- Industrial users account for roughly 5% of water use.
- Strategic users, like power generators, account for 2% of water use in South Africa.

In line with broader national growth, DWS also introduces 'non-consumptive users' as a category for the provision of hydro and solar power generation. This specifically covers water that is not consumed and can be recovered.

The categories for pricing are laid out as follows:

- **Water resource management charges:** Cover the charges required to manage water resources and waste discharge within the six water management areas determined in the National Water Resource Strategy, third edition (NWRS 3) - Section 21 of NWA.
- **Water resources infrastructure charges:** Charges relating to the development and use of waterworks, covering charges related to planning, capital costs, operation and maintenance, depreciation, and return on assets on government water schemes. Section 56 (2)(b) of NWA.
- **Waste mitigation charge:** Charges which cover the cost of discharging water containing waste into a water resource or onto land. Section 56 (5) of NWA
- **Water research levy:** Paid into a national Water Research Fund and used by the Water Research Commission (WRC) to fund water-centred Research and Development for South Africa. Water Research Act (WRA) Section 11 and 12.
- **Economic regulation charges:** Charges intended to fund the activities of the Economic Regulator, introduced in the National Water Amendment Bill.
- **Non-consumptive charge:** Charge to recover costs associated with issuing



the required water use authorisations; monitoring adherence to the conditions of the water-use authorisations; and a contribution to the operation and maintenance of the scheme to provide access to the water.

Adding context to the water resource infrastructure charges, Moshidi says: "The Pricing strategy considers the full lifecycle of the infrastructure and makes provision for the recovery of associated costs." Additionally, section 56 2(b) NWA provides that the pricing strategy may contain a strategy for setting water use charges for funding water resource development and use of waterworks, including:

- the costs of investing and planning
- the costs of design and construction
- pre-financing of development
- the costs of operations and maintenance
- a return on assets
- the costs of water distribution

Implementation

This revised strategy is not 'shock treatment' and DWS emphasises that this will be done as a 'phased' roll out. The removal of price caps, originally introduced during the apartheid era to boost agriculture but now considered outdated, will gradually be phased out over a ten-year period.

In addition, there will be a waiver of charges for qualifying resource-poor farmers and foresters from the registration of water use, including charges from Water Use Authorities (WUAs). These charges will also be phased out over ten years, with qualifying

The revised water pricing strategy is guided by the "user pays principle"

users expected to pay 100% of their charges by 2036. Measurements of water use will inform resource and water research levy charges, with adjustments made to ensure assurance of supply. DWS will manage funds from depreciation and return on asset charges in a dedicated reserve fund, prioritising asset refurbishment in line with the department's integrated water resource risk management systems. Once established, the reserve fund will be transferred to the National Water Resources Infrastructure Branch. Charges will be set for three-year intervals, with annual reviews to ensure the mechanism functions effectively; adjustments will be made at the end of each three-year cycle, with September 15th marking the cutoff date. The Minister will approve these charges following regulator review and Portfolio Committee input. During drought conditions, a system of tiered waivers will apply depending on water availability, with Treasury covering revenue shortfalls in severe cases. WUAs, individual users, or Catchment Management Agencies may approach the Department with a motivation for implementing such drought measures. When water availability drops below 50%, the Department will seek financial support from the National Treasury to recover income shortfalls from the fiscus.

This revised water pricing strategy aims to boost infrastructure, recover costs, and fund research while maintaining the mandate that water is a human right. ●

CAN A SPECIALISED MAGNETIC POWDER REMOVE MICROPLASTICS FROM DRINKING WATER?

The answer is yes

Microplastics are the crumbs of our plastic world, tiny pieces that come from bigger items breaking apart or from products like synthetic clothing and packaging.

They're now everywhere. Scientists estimate there are about 51 trillion of these particles floating in the world's surface waters, and low levels have even been found in South African tap water. **By Riona Indhur, postdoctoral research fellow, Durban University of Technology and Sheena Kumari, water scientist, Durban University of Technology**



This article was originally published in *The Conversation*

THE CONVERSATION

That's worrying because these particles can carry chemicals and bad bacteria, get eaten by fish and other wildlife, and may end up in our bodies.

We're water scientists who are looking for ways to solve this problem. In a recent study, we tested a practical fix: two "magnetic cleaning powders" that can

attach onto microplastics in water; the combined clumps can then be pulled out using a magnet. These materials are called magnetic nanocomposites (think: very fine powders with special surfaces).

The idea is simple: mix a small dose of powder into the water, let it attract and attach to microplastics, and then use a strong magnet to remove the powder-plastic clusters, leaving cleaner water behind.

Around the world, researchers have tried many different methods to capture microplastics, but our study is among the first to show that magnetic nanocomposites can work effectively not

Absorbed microplastics.
Photo by the authors of this article

only under laboratory conditions but also in real-world samples, including municipal wastewater and drinking water.

This is the first study to use these specific nanomaterials for microplastic removal,



Riona Indhur, postdoctoral research fellow, Durban University of Technology

Sheena Kumari, water scientist, Durban University of Technology





proving both their high efficiency and their practical potential. Most existing filters struggle to catch the smallest plastics, the ones most harmful to health and the environment. The next step is to test these powders on a larger scale and develop simple, affordable systems that households and water treatment plants can use.

How well do the powders work?

In our research we found that the powders were able to remove up to 96% of small polyethylene and 92% of polystyrene particles from purified water. When we tried the same approach in both drinking water and water coming out of a municipal wastewater treatment plant, the results were just as strong. In drinking water the removal was about 94% and in treated wastewater the removal was up to 92%.

Another finding from this study is that the size of the plastic particles matters. The smaller the microplastic, the easier it is for the powders to attach to it, because tiny particles can reach more of the powder's special "sticky" surface. We saw very good results for small plastics (hundreds of micrometres), but bigger particles (3-5 millimetres) were hardly removed at all. This is because they don't mix with the powder as well and there's less surface for the powder to attach onto.

In everyday terms, these magnetic powders are excellent for the small microplastics that are hardest to catch with normal filters.

Now for the big question: why do the powders attach to plastic? Think of it as being like tiny magnets. The powder and the plastics have special surfaces.

The powder acts like a magnet; the magnetic nanocomposites can work effectively not only under laboratory conditions but also in real-world samples. *Image licensed under Creative Commons*

The powder has parts that are sticky for plastics. This stickiness happens because of different kinds of forces. The plastic and powders have opposite charges which pull them together or allow them to stick together.

The key point is that the powders are engineered or specifically made to grab onto plastics so that microplastics naturally cling to them in water.

Once the powders attach onto the microplastics, we use a strong magnet (magnetic force: 250kg) to pull the powder-plastic clumps out of the water. The plastics are then separated from the powder by washing and filtration, dried, and weighed. This allows us to check how much plastic was removed. The separated powders are regenerated and reused, while the plastics are safely discarded, preventing them from re-entering the water.

We also looked at real-world questions: can you reuse the powders? And are they safe? The powders themselves are made from safe, lab-engineered materials: tiny sheets of carbon and boron nitride (a material also found in cosmetics and coatings) that are coated with magnetic iron nanoparticles. This makes them stable in water, and easy to pull out with a magnet after they've captured the microplastics.

After three rounds of use, the tested powders were effective in removing

plastics up to 80%. That means you don't need a new batch of powder every time, which is important for keeping costs down. Treating 1,000 litres of water with this method costs about US\$41 (R763), making it competitive with many existing treatment options.

For safety, we tested the filtered powder (the "filtrate") on plant growth. The results showed minimal to no toxicity, as three different plants were able to grow well in the presence of the filtrate. This is a strong sign that the method is environmentally friendly when used as intended.

What does this study mean for households and cities?

In the short term, magnetic powders could be built into small cartridges or filter units that attach to household or community water systems, helping remove microplastics before the water is used for drinking or cooking.

But the bigger picture is just as important. Microplastics are not only a South African problem but are also a global pollutant that crosses borders through rivers, oceans, and even the air we breathe. Low-cost, scalable solutions such as magnetic powders can make a real difference in resource-limited settings, where advanced filtration systems are too expensive or impractical.

Looking ahead, further work will focus on scaling up the method, testing it under more diverse water conditions, and designing simple, affordable devices that households or treatment plants can adopt.

In short: this specialised magnetic powder can tackle a tiny pollutant with big consequences. With sensible engineering and careful recovery, magnetic nanocomposites offer a promising, practical path to clean water while protecting the ecosystem from microplastic pollution. ●

Microplastics, while still being studied for their effects, have serious consequences for the environment and people



Laboratory staff undergo biosafety training on sampling collection procedures at the waste discharge area of a rural hospital

CAN WASTEWATER SURVEILLANCE WORK WITHOUT SEWERS?

Every day, we release clues about our health through our toilets, sinks, showers and tubs into the wastewater system. **By Tufts University, originally published by Newsline**

The COVID-19 pandemic spurred the rapid rise of wastewater testing, which helped health officials across the United States spot outbreaks early. Wastewater testing offers a real-time, non-invasive way to estimate how many people may be affected by a health condition in a community. But this powerful tool only works where modern sewer systems exist – even though the next pandemic could begin anywhere.

To help fill this gap, researchers from the Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy at Tufts University, Cummings School of Veterinary Medicine at

Tufts University, and Tufts University School of Medicine teamed up with international collaborators to see whether wastewater testing could work in places without modern plumbing. In a new study published in PLOS Water, the team showed that they could detect signs of disease in wastewater flowing through open channels in two urban neighbourhoods and a poultry market in West Africa.

Daniele Lantagne, a research professor at the Feinstein International Center at the Friedman School and the study's senior author, recently discussed why making wastewater surveillance more accessible matters.

What is wastewater surveillance, and how does it work?

Most people first heard about wastewater surveillance during the COVID-19 pandemic, when it helped public health officials track outbreaks. But the idea has been around much longer. For example, the Global Polio Eradication Initiative has used it to confirm that countries are free of polio,

and even law enforcement has tapped it to trace illegal drug production.

Today, across the United States, sewage from many cities and towns will flow into a single wastewater treatment plant. Giant pipes carry this wastewater in, and special devices can take small samples from these pipes every few minutes. Health officials may have only tested for the virus that causes COVID-19 at first. But now many regions also test for viruses that cause flu and RSV, and other pathogens.

What problem were you trying to solve in your new study?

In wealthier countries like the United States, wastewater testing works because we have pipes and treatment plants that collect sewage in one place. That makes it easy to sample and test the water. But around the world, more than 3.5 billion people don't have access to this kind of safely managed sanitation. Waste often ends up in open drains or pits, so the usual wastewater testing methods just don't work.

Our team wanted to find out if we could make this tool useful in places without modern plumbing and sewer systems. That meant figuring out where to collect samples, what diseases to test



Daniele Lantagne, a research professor at the Feinstein International Center at the Friedman School

for, and how to train local teams to do the work themselves.

So, what did your team find?

We focused on two kinds of high-risk places in Côte d'Ivoire in West Africa: open wastewater channels from crowded urban neighbourhoods and water used to clean poultry in local markets. We wanted to see if we could detect two major threats: SARS-CoV-2, the virus behind COVID-19, and influenza A, a virus that causes bird flu. Over 12 weeks, we collected samples and had them tested in local labs. Nearly half of the human wastewater samples showed signs of COVID-19, and we found flu virus in some of the poultry wastewater.

What's exciting is that this is one of the first times wastewater surveillance

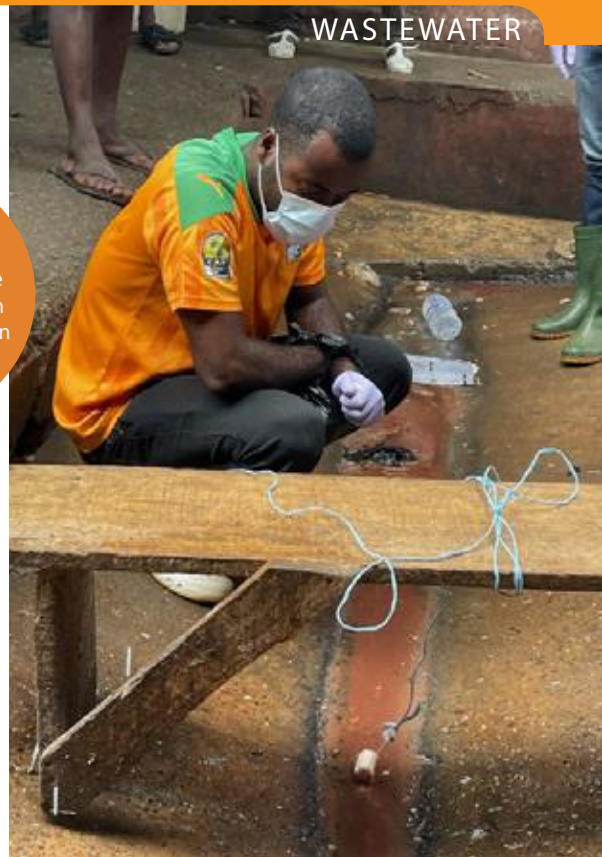
has been used in such low-resource settings. We also trained local scientists and proved that this kind of testing can work – even without expensive infrastructure.

Why does this matter?

Infectious diseases don't respect borders. If a dangerous virus like Ebola emerges in Côte d'Ivoire, it's just one plane ride away from another country. As people move into previously remote areas, we're seeing more chances for new diseases to jump from animals to humans.

Catching those threats early – right where they begin – is the best way to

Cote d'Ivoire laboratory staff set up a passive sample of water runoff from cleaning poultry at an urban market



Laboratory staff undergo biosafety training on sampling collection procedures at the waste discharge area of a rural hospital

prevent them from spreading. That's why the U.S. has long invested in public health systems around the world. Wastewater surveillance is another smart tool in that toolbox.

How else should we tap the power of wastewater testing?

We need to keep asking when wastewater testing will make the most impact. It's especially useful in places where diseases spread silently – when people don't show symptoms or can't access testing.

For example, Lassa fever, a disease carried by rats in West Africa, is likely far more widespread than we realise. It often looks like malaria, so it's frequently misdiagnosed. And while many people have mild symptoms, others get very sick with severe haemorrhagic illness – similar to Ebola – and die. Wastewater could help track its true spread.

In fact, during our study, we were about to test wastewater from a rural hospital in Côte d'Ivoire, where all the waste flows untreated into a nearby forest. We expected to detect the Lassa virus – which the hospital can't test for – but the project was cancelled due to federal budget cuts affecting our funder, the U.S. Agency for International Development (USAID). That kind of setback shows why we need more support to prove that viruses like Lassa can be detected in wastewater using low-cost, locally available tools. ●

THE MONEY IS THERE – SO WHY AREN'T WE SCALING WESS?

The Bremen Overseas Research & Development Association (Borda) recently hosted a sanitation dialogue, as part of their annual Sanitation Breakfast Seminar, where experts from government, development finance institutions, the private sector and NGOs debated why innovative and water-efficient sanitation solutions (WESS) remain sidelined despite urgent need.

Professionals agreed that money is not the main barrier to innovative sanitation in South Africa. Instead, municipalities struggle with capacity, governance, and institutional reforms that prevent new technologies from moving beyond pilot projects into mainstream service delivery.

"It can no longer be business as usual. South Africa's sanitation sector is in crisis. Aging infrastructure, rapid urban migration, and poor maintenance have left many wastewater treatment works non-compliant, while informal settlements continue to rely on unsafe or inadequate facilities. Open defecation persists in some urban and rural areas, creating severe public health and environmental risks. Although it is clear that South Africa will

not meet Sustainable Development Goal 6 (SDG 6), every effort must be made to get as close to the target as possible," says Alvin Anderson, country director, Borda South Africa.

"We need innovative funding beyond donor reliance, such as blended finance and return-on-investment models that reuse treated effluent. There is a willingness to pay for sanitation services within informal settlements, we have experienced this in Durban."

Barriers to WESS adoptions

According to Nonhla Tau, specialist: Water and Sanitation at South African Local Government Association (SALGA), a key barrier to innovative sanitation solutions is limited capacity. "There are ongoing

initiatives to train and equip municipalities on sanitation technologies. However, many still lack the ability to develop clear business cases, which makes it difficult to secure funding. Sanitation involves multiple government departments – from Human Settlements and Water and

1 Alvin Anderson, country director, Borda South Africa

2 Nonhla Tau, specialist: Water and Sanitation at South African Local Government Association (SALGA)

3 Thabo Kabini, senior specialist: water infrastructure, Industrial Development Corporation (IDC)

4 Dr Zakhele Khuzwayo, manager: innovation and technology, Johannesburg Water



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Sanitation, to Cooperative Governance, SALGA and Municipal Infrastructure Support Agency (MISA) Professionals across these institutions must be equipped with technical knowledge, financial modelling skills, and practical planning tools to evaluate, package and implement projects that demonstrate long-term viability to funders."

Another barrier is regulations. The Public Finance Management Act (PFMA) and Municipality Finance Act (MFA) are designed to curb corruption, but inadvertently stifle the adoption of new technologies because procurement frameworks are rigid and risk-averse. "However there are provisions in these acts that can be used to adopt new technologies. The challenge is that these sections are seldom explored. With the right legal and technical expertise, municipalities can create space for innovation while still complying with governance requirements," explains Thabo Kabini, senior specialist: water infrastructure, Industrial Development Corporation (IDC).

He also noted that governance failures and weak project packaging make municipalities high-risk partners. If a municipality has a history of corruption or failed delivery, it creates red flags.

Lungiswa Biyela, utility partnerships senior advisor, WaterAid (UK) adds that there is an absence of dedicated budget lines for innovation in municipalities. "The water and sanitation department will compete, for example, with the roads department for budget, and then there is further competition within the water and sanitation department for budget. Innovation more often than not takes a back seat."

Furthermore, decisions are often made at CFO level, where the priority is balancing rates and electricity revenues rather than trialling sanitation alternatives. Centralised procurement further undermines technical decision-making, resulting in wastewater treatment plants that meet tender specifications but fail to deliver compliant effluent.

Speakers urged a paradigm shift: investing not only in infrastructure, but in sustainable sanitation services. "Many sanitation projects are built but never provide a decent service. There is no regulation in South Africa that forces an entity to maintain infrastructure." Without proper operation and maintenance (O&M), even well-designed plants fail within months. Yet O&M is seldom institutionalised or regulated. Asset management frameworks and stronger accountability for service delivery were identified as essential reforms.

The good news

While innovation and funding may often appear at odds – with financiers demanding proven track records and innovators pushing untested solutions – there are mechanisms available to bridge this gap. The DBSA manages instruments like the Green Fund, provides project preparation facilities, and assists with creating blended finance models that de-risk projects and attract private-sector co-funding. These tools create space for municipalities and innovators to pilot technologies while giving funders confidence in their long-term sustainability. There is also a branch at MISA that supports municipalities in creating bankable projects.

The Water Research Commission (WRC) also plays a vital role in de-risking innovation by funding early research and demonstration projects. However, uptake often only occurs during crises, leaving promising technologies underutilised.

"Johannesburg Water has recognised that many solutions to problems in the water sector lie in innovation. We therefore decided to create a research, development and innovation unit to foster and drive the use of technology for efficient operations. Wherever there is a business case for a certain innovation, we try to allocate any possible resources towards it," comments Dr Zakhele Khuzwayo, manager: innovation and technology, Johannesburg Water.

The revised norms and standards will promote the adoption of WESS. While new developments may still connect to existing sewer networks where capacity allows, they will be required to invest in decentralised or non-sewered alternatives in areas where capacity is limited.

The dialogue underscored that solving South Africa's sanitation challenge requires more than capital. There is a dire need to normalise practices such as decentralised wastewater treatment, rather than branding them as 'alternative.' It calls for political will, professionalisation, stronger partnerships, and regulatory reforms that empower municipalities to adopt water-efficient sanitation solutions at scale. Above all, citizens need to value sanitation services and be willing to pay for them. The technology exists. The funding exists. What is missing is the bridge between innovation and implementation. ●

ENGINEERING EFFICIENCY THROUGH MODULAR WATER STORAGE SYSTEMS



On-site water storage has become a necessity for many sectors such as retail, mining, and agriculture.

Whether the water is used for backup, or part of the operations, finding the right, robust water storage has become essential.

The modular nature of these tanks allows for them to be built exactly where they are needed

Speaking to this growing need, Paul Warrener, development and marketing manager at Rainbow Reservoirs, a water tank manufacturer, says, "The need for reliable storage has allowed Rainbow Reservoirs to grow significantly since its inception in 2003."

Founded in Benoni, Rainbow Reservoirs has experienced substantial growth in recent years, attributed to a consistent focus on quality, compliance, and innovation. "From the outset, our goal was to design tanks that meet the Australian water industry standards, which are among the strictest globally," Warrener explained. "Even though we operate locally, we have always aspired to match international benchmarks."

Materials and durability

The key to meeting client expectations is "ensuring that standards are met and exceeded. We manufacture to Australian standards because they are highly regarded and allow us to have a global

footprint." Part of these standards is a careful selection of materials.

Rainbow Reservoirs manufactures its tanks using Aluzinc steel and RPVC liners, both chosen for strength and corrosion resistance. According to Warrener, Aluzinc comprises 55% aluminium, 43.4% zinc and 1.6% silicon, making it "around six times more resistant to corrosion than standard galvanised steel". It is also heat- and thermo-resistant, extending the lifespan of each tank.

The company's tanks are designed with a 40-year life expectancy, provided that installation and site preparation are completed to specification. "Smaller tanks don't even require concrete bases," Warrener said. "They can be installed on compacted ground with a plaster-sand layer, which reduces cost for smaller clients." The tanks comprise the shell and the liner; there is no bottom, so while site preparation is essential, the tanks are also easier and less time-consuming to place than tanks requiring a bottom shell.



Paul Warrener, development and marketing manager at Rainbow Reservoirs

While international standards apply, the company also ensures South African National Standards (SANS) compliance. Engineering calculations incorporate safety factors for hydrostatic pressure, wind loading and thermal expansion.

"The design combines high-quality materials with proven installation and construction methods," Warrener says. "This ensures the tanks remain reliable, durable and fully functional in demanding environments."

Modular engineering

One of the company's key differentiators lies in its modular, panel-based construction, which enhances transport, installation, and maintenance efficiency. "The modular system allows for quick and easy assembly," explains Warrener. "This reduces labour time and installation costs while enabling faster access to water. Transport costs are also minimised, as all tanks are flat-packed, simplifying logistics. A 150 000-litre tank can fit on a five-metre deck space."

Maintenance processes are equally efficient. "If a panel needs to be replaced, it can simply be removed and substituted without affecting the rest of the structure," he adds. "Downtime is minimal." On larger tanks a manhole is fitted, which means that leaks are easier to isolate and repair.

The modular nature of the tanks means customisation and context-specific tanks are easily pulled together. Warrener cites a project at the Mall of Africa, where two nine-metre tanks were installed within a confined parking structure. "The spiral elevators that drive up a level have a column in the middle. We were able to install the tanks

on-site in this space precisely because of the modular design. An approach that would have been impossible with welded tanks," explains Warrener.

Application in mining

Rainbow Reservoirs' modular tanks are increasingly used in mining applications, where they must withstand corrosive and high-stress environments. "Our materials and coatings are designed to handle aggressive water chemistries associated with mines," says Warrener. "Alongside Aluzinc, the Components are hot-dip galvanised, and for highly corrosive conditions we use fusion-bonded epoxy (FBE) or thermoplastic powder coatings."

The liner materials are selected based on the type of liquid being stored. "We adapt the liner's composition and thickness depending on the water's acidity or intended use," he adds, "for daily use like showering and cleaning, the liners will differ from those in operations."

The integration of tanks within a mine's water management system requires detailed engineering consideration. "Water balance is critical," notes Warrener. "The tank's capacity must align with the mine's operational demand, and the inlet and outlet systems must support process efficiency. Every installation is assessed for scalability and sustainability."

Rainbow Reservoirs ensures compliance with all site-specific safety standards during installation. Once commissioned, operational monitoring is managed by the client. "After commissioning, the mine assumes

responsibility," says Warrener. "However, we provide full after-sales support. Our tanks carry a 12-year warranty and are designed to last approximately 40 years."

Global reach

Rainbow Reservoirs operates across more than 30 countries, supplying tanks for emergency, municipal, agricultural, industrial, and mining applications. Recent projects include a large-scale installation for an international mining client. "We recently completed a 34-million-litre water storage facility consisting of eight tanks," Warrener confirmed. "The first phase, completed earlier, provided 12 million litres of storage, sufficient for 72 hours of backup supply. This year, we expanded capacity by an additional 22 million litres with four 5.5-million-litre tanks, each approximately 28 metres in diameter."

Reflecting on the company's long-term performance, Warrener described a field visit to one of Rainbow Reservoir's earliest installations. "I visited a small farm tank installed over 14 years ago," he said. "Apart from consumables such as bolts and the liner, the panels and structure were still intact. It reinforced my confidence in the durability of our materials and design."

Rainbow Reservoirs' approach demonstrates how modular engineering can deliver robust, scalable, and cost-effective water infrastructure across multiple sectors. Through its focus on material quality, standard compliance, and adaptable design, the company continues to position itself as a leader in sustainable water storage solutions. ●



Transporting the tanks is relatively easy as they are flat packed as opposed to fully assembled

BUILDING RESILIENCE INTO THE GOUDRAND WATER TOWER

Afrisam is supplying specially designed readymix concrete to meet both structural and seismic performance requirements of a 44 m high water tower to support the new Goudrand mega city development near Main Reef Road south of Johannesburg.

With construction led by M&D Construction and engineering design by SCIP Engineering Group, the project has demanded highly customised concrete solutions from AfriSam. Storing 3.2 Mℓ of water, the structure is located in a seismically active zone and required additional reinforcement in the lower section of the shaft to withstand ground acceleration above 0.1 g. This called for increased steel density and a concrete mix that could deliver strength, flowability and controlled heat of hydration.

AfriSam's product technical team leader, Mduduzi Ndlovu, explains that the concrete mix was developed with a high proportion of supplementary cementitious materials (SCMs) to reduce the heat generated during curing. "The base mix comprised 70% ground granulated blastfurnace slag (GGBS) and 30% AfriSam High Strength Cement, reducing the ordinary Portland cement (OPC) content to just 20%," says Ndlovu. "Despite the low OPC content, the mix exceeded expectations – achieving the target strength of 51 MPa was achieved in only 28 days in relation to the designed 56 day requirement."

The construction process placed high demands on the readymix in terms of both slump control and delivery precision.

With over 210 kg of rebar per cubic metre in some sections, AfriSam developed a high slump pump mix for vertical pours, while limiting slump to 130 mm for slanted sections to avoid concrete sliding off shuttering.

Sheldon Temlett, contracts manager at M&D Construction, highlights the importance of this mix performance. "With such dense steel and complex geometry, AfriSam's mix gave us the workability we needed without compromising quality. Their team worked closely with us to adjust slump levels and plan deliveries around our 12 m³/hour pour rate."

AfriSam territory manager Toni Williams adds that logistics were carefully aligned with construction progress to avoid delays or idle time on site. "Coordination was key to supporting M&D's controlled rise rate of one metre per hour, especially as the concrete had to partially set before each formwork lift could proceed."

Construction of the Main Reef water tower began in September 2024 and is scheduled for completion in April 2026. Once commissioned, it will provide essential water infrastructure to approximately 20 000 homes in the Goudrand housing development – a major project spearheaded by the Gauteng Department of Housing, the City of Johannesburg and Blue Print Housing. ●



Laboratory staff undergo biosafety training on sampling collection procedures at the waste discharge area of a rural hospital



To address the seismic risk, installing the reinforcing steel was especially demanding, with more than 210 kilograms of rebar required per cubic metre

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