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Ofentse Nthutang, CEO, Magalies Water

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SECURING AFRICA'S CHLORINE ON SITE

WATER SERVICES AMENDMENT BILL MOVES SECTION 78 INTO THE SPOTLIGHT

WHO SAFEGUARDS WATER AFTER IT CROSSES THE MUNICIPAL METER?

Climate change demands that we stop feeding leaks

Sipho Mosai, CEO, Rand Water

INDUSTRY INSIGHT



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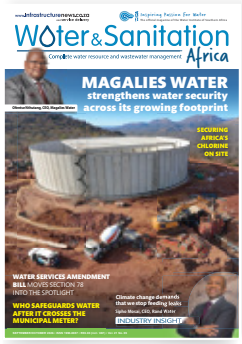
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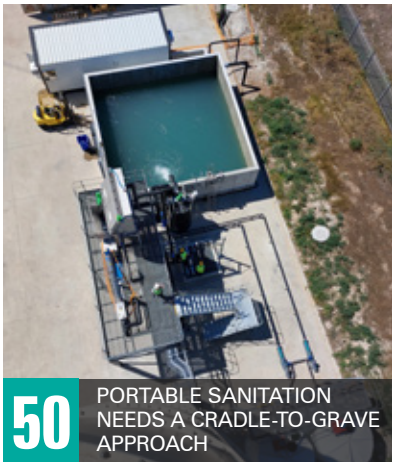
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INDUSTRY INSIGHT

As climate change places pressure on South Africa's water resources, Rand Water is calling for a unified approach to water security. According to group chief executive Sipho Mosai, climate resilience depends not only on increasing supply, but also on reducing water losses, strengthening infrastructure and improving collaboration across the sector. P10



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All I want to say is that they don't really care about us

I am living in a province where 833 people have sought medical attention for gastrointestinal symptoms, including 328 children aged between zero and four years because the Tshwane Metropolitan Municipality not only neglected to secure a chlorine supply for the Bronkhorstspruit Water Treatment Works, but they elected to stay silent.

Thousands of people in Bronkhorstspruit drank contaminated water. For three weeks! Three weeks! People continued filling their kettles, preparing baby formula, cooking meals, washing vegetables and giving their children glasses of water. They did so with the entirely reasonable expectation that the water supplied by their municipality was safe.

This incident was not a mistake. This was not an unfortunate oversight. This was not a missed deadline or a minor operational hiccup. For three entire weeks, people's lives were put at risk and the Tshwane Metropolitan Municipality did … nothing.

And let us be absolutely clear about something. This was a decision. No action is a decision. The Tshwane Metropolitan Municipality decided not to purchase chlorine and then they decided not to issue a warning. The decision did not rest with the suspended plant manager. Every day, the work of water professionals is undermined by procurement failures and warnings disappear into layers of bureaucracy, political and administrative dysfunction. We all know that.

According to Minister Pemmy Majodina, 833 people seeking medical attention cannot be classified as an outbreak as people have to die first. In all honesty though, can we even trust the number 833? Apparently, the number of people has been counted since 7 October – that is already two weeks into the municipality's three-week experiment in whether chlorine is really necessary for treating drinking water.

And yes, now there are calls for 'strengthened intergovernmental collaboration'. What a phrase. I would make it simpler – buy and use the chlorine.

I keep returning to the same uncomfortable conclusion. They don't really care about us. Because if they did, they would have bought the chlorine. And if they couldn't buy the chlorine, they would at least have told us not to drink the water.

Not even the president can fire a mayor, but on the 4th of November, we can.

Are water treatment chemicals part of water security?

We have a feature on water treatment chemicals in this issue. I interviewed representatives from a few companies for the feature, long before the Bronkhorstspruit story broke my heart.

Chlorine, coagulants, flocculants, pH correction chemicals and other treatment products are not peripheral purchases that can be delayed when municipal budgets become strained. They are essential operational inputs.

How many local chemical manufacturers do we have? What happens when a plant breaks down? How reliant are we on imports? Events such as the Covid-19 pandemic, the Suez Canal blockage and recent tensions around the Strait of Hormuz can further add to the fragility of global supply chains. We should value and promote more local chemical production. ●

Kirsten





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You said it in *WASA*

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



"The final measure of a water security project is not the size of a raw water allocation or the value of a water infrastructure construction programme. It is whether safe drinking water actually reaches communities consistently. My quest is to ensure that every community we are supposed to supply gets the water it needs." **Ofentse Nthutang, chief executive, Magalies Water**

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"We understand that water security cannot be achieved by a bulk water supplier alone. The challenge before us is much bigger than any institution. We need to strengthen collaborations across all players in the value chain, and most importantly, we ought to translate our collective knowledge and responsibilities into practical solutions." **Sipho Mosai, group chief executive, Rand Water**

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"When responsibility is fragmented and institutions work in isolation, weaknesses multiply and communities carry the consequences. When people and institutions work together, strengths are shared, knowledge moves more freely and better solutions become possible. Ultimately, that is what a resilient water sector should look like: people willing to share what they know, institutions willing to support one another and a collective commitment to ensuring that water remains available, sustainable and secure for the generations that follow. **Dr Lester Goldman, CEO, WISA**

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"As the WISA chairman, my leadership philosophy is simple: listen with humility, unite with purpose, lead through service and deliver together. We must empower young water professionals while drawing on the experience of established practitioners, creating a profession that learns across generations and works collectively towards lasting impact." **Dr Ashton Busani Mpofu, chairman, WISA**

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"Local manufacturing of water treatment chemicals is about more than supporting South African industry. It is a matter of water security. Municipalities, water boards, mines and industrial operations depend on a continuous supply of chemicals to treat water, and any interruption can have serious consequences. As a local manufacturer, we have control over product quality, formulation and availability." **Joyce Jabane Bauwens, general manager of Water Care at Protea Chemicals**

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"In reality, developing an effective water treatment programme requires a detailed assessment of the boiler, its operating conditions and the quality and quantity of water being used as well as the product the steam is being used to produce. The food and beverage industry must use SANS 1827 compliant chemicals, where as other industries can use a greater range of chemicals that are not food-safe like anti-corrosion foam for pipes." **Lionel Maasdorp, managing director, Allmech**

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"A procurement department may dismiss onsite chlorine generation because it only focuses on the base price of chlorine gas (the cheapest source of chlorine), without factoring in the operational and financial risks of supply failure, the capital expenditure needed for the storage of the entire chlorine gas system, additional equipment for dosing, transport costs as well as safety equipment." **Tom Homan Free, managing director, ProMinent South Africa**

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"South Africa can no longer treat private back-up water systems as isolated household or business decisions. As their use expands, they increasingly form part of the broader water supply network and must be managed accordingly. Currently, there are no operational maintenance or monitoring obligations for individual, private storage systems. Stored water is often introduced into buildings, often without any monitoring or treatment in place." **Ayesha Laher, director of AHL Water and the technical lead for the WRC study**

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"When sizing water storage, a key consideration is days of autonomy. How long can an organisation remain operational if its normal water supply fails? The appropriate figure varies according to location, reliability, and the consequences of an outage. A relatively reliable municipal system experiencing occasional maintenance interruptions might require two to three days of storage, while areas with chronic infrastructure problems may require five to seven days. Critical infrastructure such as healthcare facilities requires a more conservative approach. It is about assessing what you need to do, what you can't do, and what you can afford to do." **Paul Warrener, operations manager of Rainbow Reservoirs**

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"Water storage provides municipalities with valuable flexibility when infrastructure failures occur or planned maintenance is required. South Africa's municipalities continue to face ageing infrastructure, increasing demand, power interruptions, and significant water losses. During these events, strategically positioned storage tanks can continue supplying communities while repairs are undertaken upstream. Additional satellite storage located above or below existing reservoirs could allow maintenance to proceed without immediately disrupting water supply to consumers." **Chris Evans, brand ambassador and business developer, SBS Tanks**

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"Our clients would prefer not to take on the responsibility of operations and maintenance of sewage treatment plants. However, they need the assurance that the plant is operating correctly and that somebody will identify a problem before it causes a spill or affects treatment performance. So in addition to designing and manufacturing the wastewater treatment systems, Calcamite also provides (in most cases) maintenance support." **Sebasti Badenhorst, COO of Calcamite**

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"An important feature of Section 78 of the Municipal Systems Act is that it does not place internal and external provision on an equal starting line. It favours internal provision. A municipality must first assess whether it can provide the service internally before considering an external mechanism. This is not something that can be taken lightly. The internal assessment considers factors such as the direct and indirect costs and benefits of the service, the municipality's current and future capacity, and the likely effect on municipal employees." **Alana Potter, specialist: sanitation and hygiene at the South African Local Government Association (Salga)**

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"Democracy is not just the ability to vote. Being an active citizen means understanding how government affects you and advocating for yourself and others for change. Part of WaterCAN's mission is to give interested members of the public the tools to test and understand their water, make informed decisions and escalate issues to government." **Dr Ferial Adam, CEO of WaterCAN**

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"Ultimately, the measure of a sanitation service is therefore not the number of toilets delivered. It is whether people can use them with dignity, whether workers can service them safely and whether every load of waste reaches an authorised treatment or disposal point. That is what cradle-to-grave responsibility looks like in practice, and we give our customers peace of mind by embracing this concept." **Robert Easmus, MD, Sanitech**

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Magalies Water is a very different organisation from the one that served a much smaller footprint a little more than three years ago

PLANNING FOR WATER SECURITY ACROSS A GROWING SERVICE AREA

Magalies Water is a very different organisation from the one that served a much smaller footprint a little more than three years ago. **Kirsten Kelly** speaks to chief executive **Ofentse Nthutang** about water security, bulk water infrastructure and climate resilience.

Following the integration of former Sedibeng Water North-West operations, Magalies Water's service area now extends across three provinces: the whole of the North-West as well as a portion of Limpopo (parts of Waterberg District Municipality) and Gauteng province (parts of the City of Tshwane) – a total of 128 550 m^2. Water demand across the area is forecast to rise from the 2024 baseline figure of 1 565 Mℓ/day to 2 026 Mℓ/day by 2054 – an increase of almost 30%.



Ofentse Nthutang, Chief Executive Officer, Magalies Water

"These projections are in our updated bulk water and sanitation master plan, which we use to prioritise bulk water infrastructure projects and other financial commitments that can better strengthen water security. We need to know where water is available, where the gaps are and how we can support supply across those areas. We cannot roll out infrastructure simply based on a hunch, we use qualitative and quantitative data to support our decisions, Infrastructure roll-out requires meticulous planning," states Nthutang.

Enough water – but not everywhere

Asked whether Magalies Water has sufficient licensed raw-water allocations to meet projected demand, Nthutang gives a deliberately qualified answer. "It is yes and no. It depends on the area."

The distinction lies between the water board's Section 29 operations (its primary bulk water mandate in terms of the Water Services Act), and Section 30 activities undertaken on behalf of municipalities. Across most Section 29 schemes, Nthutang says there is still licensed headroom. Under its Section 30 operations, Magalies Water operates municipal systems, but the raw-water licences are generally held by the municipalities. Some of these areas already have supply deficits, which the master plan seeks to address through new surface-water schemes, groundwater development, water reuse and regional transfers.

"Currently, we are using roughly 50% of our raw water allocation, which gives us room to respond to increased growth in Rustenburg, Moses Kotane, Bela-Bela, Modimolle-Mookgophong and Moretele," states Nthutang.

He cautions that water may be available within a regional system but still be separated from demand by insufficient treatment capacity, reservoirs, pump stations or bulk pipelines.

A broader supply mix

Magalies Water is not relying on one source or one type of infrastructure. Its master plan considers surface water, groundwater, decentralised treatment and reuse.

Maquassi Hills, in North West's Dr Kenneth Kaunda District, faces a significant water supply deficit. Magalies Water is investigating the possibility of redirecting water from Bloemhof Dam to the area.

In the largely rural Dr Ruth Segomotsi Mompati District Municipality, communities in areas such as Mamusa, Greater Taung and Kagisano-Molopo require a combination of surface water and groundwater. Where settlements are

Magalies Water's licensed raw-water allocations and reported daily use across its principal bulk water supply schemes

Scheme	Supply areas	Licensed allocation	Reported use
Klipvoor/ Moretele North	Moretele, Bela-Bela, Modimolle-Mookgophong, Mogalakwena, Rustenburg, Moses Kotane and Thabazimbi	60 Mℓ/day	Not yet substantially used
Klipdrift	Hammanskraal, Mandela Village, Marokolong, Ramotse, Kekana Gardens, Kudube Unit 9, Babelegi Industrial, Bridgeview, Moretele, Bela-Bela, Modimolle-Mookgophong, Kwalata Game Reserve	92 Mℓ/day	Approximately 77 Mℓ/day
Vaalkop	Rustenburg, Moses Kotane, Thabazimbi, Mogwase, Northam, Sun City, Monakato, Maile and the Royal Bafokeng Administration	340 Mℓ/day	Approximately 250 Mℓ/day
Wallmannsthal	Wallmannsthal, Leeuwfontein, Baviaanspoort, Kameeldrift and parts of Derdepark	30 Mℓ/day	Approximately 12 Mℓ/day
Cullinan	Cullinan, Rayton, Refilwe and Zonderwater areas in the City of Tshwane as well as Petra Diamond Mine	18 Mℓ/day	Approximately 12 Mℓ/day

dispersed, decentralised systems can be more practical and affordable than long regional pipelines.

Mahikeng already depends heavily on groundwater and reuse, and these sources are close to full utilisation. The wider plan therefore considers augmentation from the Vaalkop system for parts of Ngaka Modiri Molema District Municipality, including Ramotshere Moiloa and Ratlou area.

In Rustenburg, Magalies Water is also assessing whether treated wastewater can meet a greater share of mining demand, releasing potable water for communities.

Pollution is a major threat to bulk water supply

Magalies Water is confronted with some of the country's most compromised raw water matrix. Several of the water board's abstraction points sit near the tail end of the heavily used Crocodile West and Pienaars River systems. By the time water reaches Bospoort, Roodekopjes, Vaalkop or Roodeplaat dams, it carries the cumulative effect of partially treated wastewater, industrial discharges, mining activity and diffuse urban runoff. "One of the main threats to water security is deteriorating raw-water quality," says Nthutang. "Higher contamination levels drive up operational costs of treatment plants, increase energy consumption and accelerate infrastructure wear through intensified strain. Treatment becomes less efficient, more complex and expensive."

Ammonia is a particular concern because conventional drinking-water plants were not designed to remove high concentrations of it. Nutrient-rich water also drives algal blooms and invasive aquatic vegetation, which can obstruct abstraction screens before treatment has even started.

Magalies Water has responded by strengthening the science around its operations. Its SANAS-accredited laboratory holds 73 accredited methods and conducts more than 240 000 analyses a year. Raw-water results are communicated to production teams for real-time process adjustments, while process technology and research teams assess treatment improvements and emerging contaminants. In 2024/25, acute microbiological and acute chemical compliance both exceeded 99%.

The same science supports pollution profiling and source tracking in the Crocodile West Catchment. At Hartbeespoort Dam, Magalies Water combines mechanical removal of invasive vegetation with biological and oxidative remediation, including nanobubble and bioremediation interventions. These measures can improve conditions within the dam, but their long-term value depends on reducing the pollution entering from upstream.

Water lost

Non-revenue water presents a second, immediate threat to water. The Magalies Water 2024/25 annual report recorded avoidable process losses at their plants of 4.65%, within the target of 6%. The current overall estimate is closer to 18%, however, with the deteriorated bulk pipeline supplying Thabazimbi a major contributor. Nthutang says a contractor has been appointed to replace the affected line.

Losses within some municipal distribution systems are considerably higher. Nthutang cites estimates of about 40% in Rustenburg and close to 60% in Thabazimbi. These losses do not all occur on infrastructure owned by the water board, but they reduce the benefit of every additional megalitre treated and supplied. Non revenue water also puts municipal finances under strain, negatively impacting their ability to pay water boards.

"If we address the water that is being lost, we can supply more people with the resource already available," he says.



Vaalkop Water Treatment Plant



At Hartbeespoort Dam, Magalies Water combines mechanical removal of invasive vegetation with biological and oxidative remediation, including nanobubble and bioremediation intervention

Magalies Water is working with municipalities on leak reduction, water safety plans, process audits, smart metering and water conservation and demand management.

Climate risk is a reality

Another challenge is climate change – that cuts across both water quantity and quality. Floods can damage bulk water infrastructure and carry concentrated pollution into rivers, while drought reduces raw water availability and concentrates nutrients in dams.

During 2024/25, critically low levels at Vaalkop Dam forced Magalies Water to reduce abstraction at its largest treatment works by 30% for a period.

Nthutang says that the utility activated its business continuity arrangements and used transfers within the wider system to support the dam.

The experience changed the way risk is treated. Dam levels are now monitored continuously, while drought and flood response plans are integrated into operational and infrastructure planning, especially in anticipation of El Nino.

"We may be affected by either floods or drought, so our business continuity models must inform us how to respond and minimise climate change impacts. We aim to be proactive in our response to climate change," he says.

Finance cannot be separated from water security

The ability to maintain existing assets and build new ones depends on cash collection. At the time of the interview, Nthutang estimated that Magalies Water was owed around R3 billion.

The 2024/25 audited annual report showcases the scale of the problem: gross trade and other receivables stood at about R2.77 billion at 30 June 2025, while net receivables were R1.8 billion after impairments and write-offs.

"Non payment is a huge challenge for all water boards. If municipalities do not pay for the water they consume, it puts strain on a water service provider's ability to invest in the maintenance and upkeep of infrastructure," he says. "Non-payment threatens water security."

Magalies Water is a Schedule 3B entity whose operating model depends largely on water sales. Although the 2024/25 financial year produced a stronger surplus, the annual report estimates that more than R12 billion is still required for the capital project pipeline.

This is why debt collection, borrowing approvals, government infrastructure funding and firm agreements with off-takers form part of water-security planning rather than sitting outside it.

Magalies Water's SANAS-accredited laboratory has 73 accredited methods and conducts more than 240 000 analyses annually



Projects that create resilience

For Magalies Water, water security depends on implementing bulk water projects that expand supply capacity and keep pace with growing demand across its service area.

The clearest example of new capacity is the Hammanskraal intervention at Klipdrift. A 50 Mℓ/day modular treatment plant was developed alongside the existing 42 Mℓ/day water treatment works, taking the site's combined design capacity to 92 Mℓ/day.

Four 12.5 Mℓ/day modules combine dissolved air flotation and continuous sand filtration within a compact footprint. Operating the conventional and modular plants together allows the treatment load to be shared and gives chemicals and physical processes the retention time needed when raw-water quality deteriorates.

This intervention is Magalies Water's most complex recent infrastructure project. Together, the Klipdrift Water Treatment Plant and the Klipdrift Modular Treatment plant is designed to support about 47 550 households with a population of 180 679 in Hammanskraal.

"It was not an easy project," says Nthutang. "We had to implement a brownfield project while the plant was still operating. Its successful implementation is one of the achievements of which I am most proud."

Klipdrift is one component of a much larger programme. The Moretele North Klipvoor Bulk Water Supply Scheme is planned to add 60 Mℓ/day for communities in North West and Limpopo, including Moretele, Mogalakwena, Modimolle-Mookgophong and Bela-Bela. "We are currently supplying Modimolle-Mookgophong and Bela-Bela through the Klipdrift Water Supply Scheme, but this project will address any supply gaps. Magalies Water has been requested to include Madibeng North areas like Jericho and Legonyane to the scheme and are investigating how to assist," adds Nthutang. The Budget Facility for Infrastructure approved R1.9 billion for the scheme's social component, but further funding is required for the full scope. "In order to source additional funding, our technical and financial consultants have identified gaps in our project preparation



With new pipelines, reservoirs, and a water treatment plant at Klipvoor Dam, the Moretele North Klipvoor Bulk Water Supply Scheme will deliver 42 Ml of water daily, transforming lives in Moretele North, Ngobi, Bela-Bela, Modimolle, Mookgophong, and Mokopane.

and are working with the Infrastructure Finance and Implementation Support Agency to improve bankability."

The Pilanesberg Bulk Water Supply Scheme Phase 2 will strengthen supply around Rustenburg and Moses Kotane and has R1.8 billion in approved with the Budget Facility for Infrastructure as well as the Department of Water and Sanitation's Regional Bulk Infrastructure Grant (RBIG). Magalies Water is seeking debt finance and participation from major off-takers for the remaining components.

At Wallmannsthal, a project of about R500 million will increase treatment capacity to 30 Mℓ/day and extend storage and distribution infrastructure for growth in areas such as Wallmannsthal and Roodeplaat in the City of Tshwane. Magalies Water hopes to fund this internally as well as source funding from commercial banks.

Vaalkop remains central to the network. A R195 million raw-water upgrade has increased available pumping capacity to about 345 Mℓ/day and created a central inlet for future expansion. This was implemented using Magalies Water's internal funding. The next treatment upgrade is estimated at around R3 billion and is intended to secure supply for Bojanala, Thabazimbi, mining operations and emerging renewable-energy developments. Nthutang hopes to register the treatment upgrade as one of the Strategic Integrated Projects (SIPs) once the implementation readiness study is completed.

Smaller and inherited projects are equally important to regional resilience. Moretele South combines pipelines and a 25 Mℓ command reservoir to meet projected demand of 25.7 Mℓ/day by 2040.

The Mmabatho Water Treatment Works upgrade increases capacity from 20 Mℓ/day to 30 Mℓ/day for Mahikeng and surrounding villages, while the Dinokana intervention doubles high-lift pumping capacity from 2 Mℓ/day to 4 Mℓ/day, refurbishes groundwater sources and adds storage and distribution infrastructure.

Planning before construction

These projects illustrate why a call for another reservoir or pipeline cannot translate immediately into construction. A master plan must first establish demand, source yield, treatment requirements and the relationship to existing infrastructure.

Feasibility and implementation-readiness studies follow, together with environmental approvals, servitudes, off-take agreements, funding models, borrowing approvals and procurement. Pipeline routes can also cross communally on privately held land, making early agreements over servitudes essential.

A significant portion of time is spent on mobilising financial resources wherever there are shortfalls. When sourcing funding, Magalies Water has to put systems and security in place to guarantee repayment.

These steps take time, but they are what protect projects from unplanned cost escalation and reduce the risk of infrastructure being built without the revenue needed to operate and repay it.

Security measured at community level

For Nthutang, the final measure of succes is not the size of an allocation or the value of a construction programme. It is whether safe drinking water actually reaches communities consistently.

He identifies Maquassi Hills as one of the areas that continues to concern him because leaks and interruptions can persist beyond the bulk supply point. Magalies Water is working with the municipality where it can, recognising that residents experience the system as a whole rather than separating the water board's infrastructure from the local distribution network.

Rustenburg poses a different balancing act. Its mines are a major contributor to the national economy, but the communities that provide the workforce also require reliable supply.

"There is no point supplying the mines if the communities whose people work in those mines are not receiving water," Nthutang says. "We have to strike that balance."

That is the practical meaning of water security across Magalies Water's expanded network. It requires enough licensed water, but also healthy catchments, efficient plants, sound municipal systems, maintained pipelines, reliable revenue and projects that reach the places where demand is growing.

"My quest is to ensure that every community we are supposed to supply gets the water it needs," Nthutang concludes. ●

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CLIMATE CHANGE DEMANDS THAT WE STOP FEEDING LEAKS



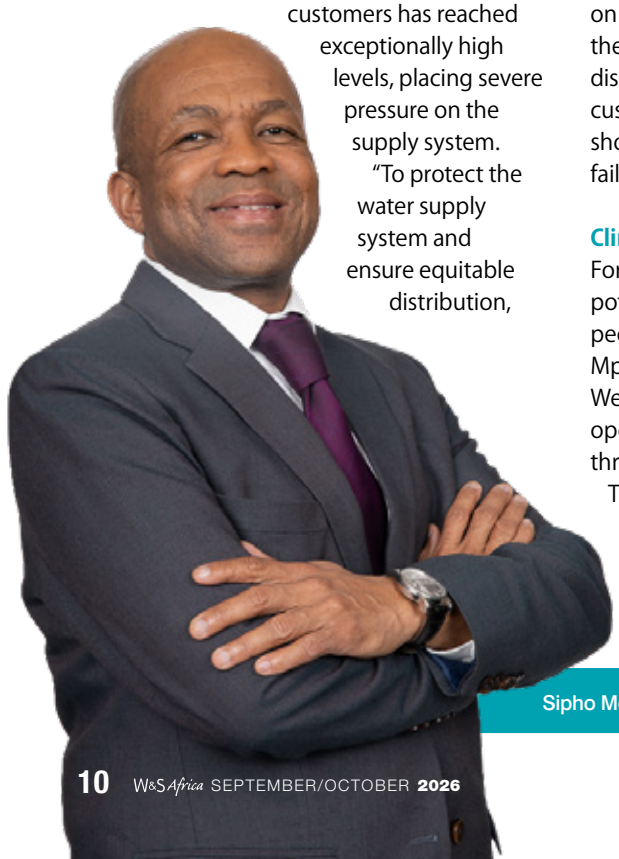
As climate change places pressure on South Africa's water resources, Rand Water is calling for a unified approach to water security. According to group chief executive Sipho Mosai, climate resilience depends not only on increasing supply, but also on reducing water losses, strengthening infrastructure and improving collaboration across the sector.

"Rand Water is pumping at maximum capacity. A water supply system cannot produce, treat and distribute unlimited volumes simply because demand continues to rise," he warns.

The water utility recently warned that consumption by several municipal customers has reached exceptionally high levels, placing severe pressure on the supply system.

"To protect the water supply system and ensure equitable distribution, Rand Water will begin restricting supply to municipalities that continue to exceed their allocated consumption volumes. These restrictions may result in low water pressure or intermittent water supply in affected municipalities," explains Mosai.

He adds that excessive water consumption places an unfair burden on municipalities that remain within their permitted limits. "Water must be distributed equitably and the efforts of customers who reduce their consumption should not be undermined by those who fail to do so."



Sipho Mosai, group chief executive, Rand Water

Climate change

For Rand Water, which supplies bulk potable water to more than 18 million people across Gauteng and parts of Mpumalanga, the Free State and North West, climate change represents both an operational challenge and a long-term threat to water security.

The utility relies primarily on the Integrated Vaal River System, which must support growing demand from households, industries and municipalities. Population growth, urbanisation and increasing consumption are placing additional pressure on this finite resource.

Speaking at the Gauteng Water and Sanitation Dialogue on El Niño 2026, Mosai warned that the sector can no longer respond to rising demand by simply increasing water production. "We cannot continue to respond to the challenges, particularly El Niño, by simply instructing Rand Water to abstract more water. It's not going to work."

His message is clear. South Africa must move away from managing water shortages primarily through supply augmentation and towards a more integrated approach that protects existing resources, reduces losses and builds resilience throughout the water value chain.

Climate change is already affecting water security

South Africa receives an average annual rainfall of approximately 450 mm, considerably below the global average of 860 mm. Its semi-arid climate makes the country particularly vulnerable to changes in rainfall and temperature.

Climate change is expected to intensify these vulnerabilities. Higher

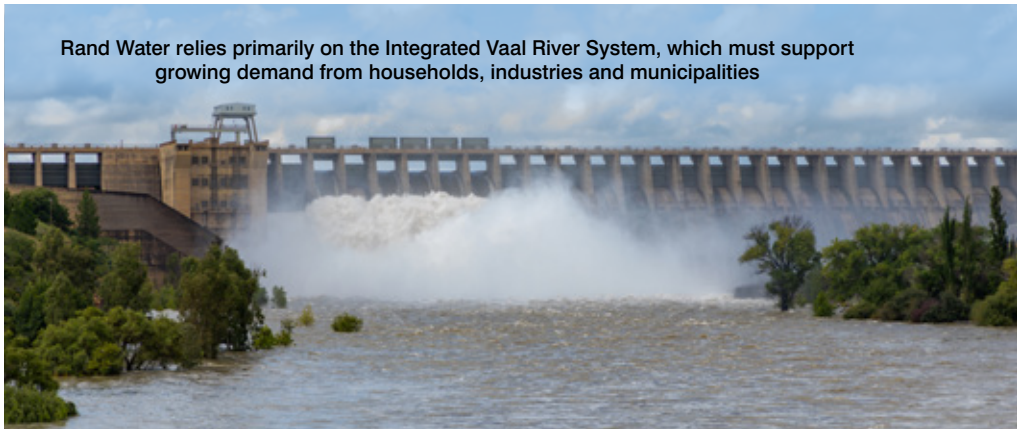
temperatures increase evaporation from dams and reservoirs, while prolonged dry periods reduce river flows and place additional pressure on available supplies.

Extreme rainfall events present a different challenge. Flooding can damage infrastructure, increase sediment loads and introduce pollutants into raw water sources, complicating treatment processes and increasing operational costs.

For Rand Water, climate resilience therefore involves preparing for both water scarcity and extreme weather.

The prospect of El Niño conditions during the 2026/27 summer has brought these challenges into sharper focus. El Niño is a naturally occurring climate phenomenon, distinct from long-term climate change, but it can contribute to hotter and drier conditions across parts of Southern Africa.

Mosai cautions that rainfall outcomes will vary geographically and that the sector must prepare for uncertainty rather than rely on a single forecast. "We must think long term, because climate change is here and is here for a long time."



Rand Water relies primarily on the Integrated Vaal River System, which must support growing demand from households, industries and municipalities

We cannot keep feeding the leaks

One of Mosai's strongest messages concerns the relationship between water losses and the pressure to increase bulk water production.

South Africa's high levels of non-revenue water mean that substantial volumes of treated water are lost through leaking infrastructure, illegal connections and other distribution inefficiencies before reaching consumers.

When temperatures rise and consumption increases, the immediate response is often to request additional water from bulk suppliers.

However, Mosai argues that increasing production without addressing municipal distribution losses simply compounds the problem. "In essence, by doing so, we are not providing people with water; we are feeding the leaks."

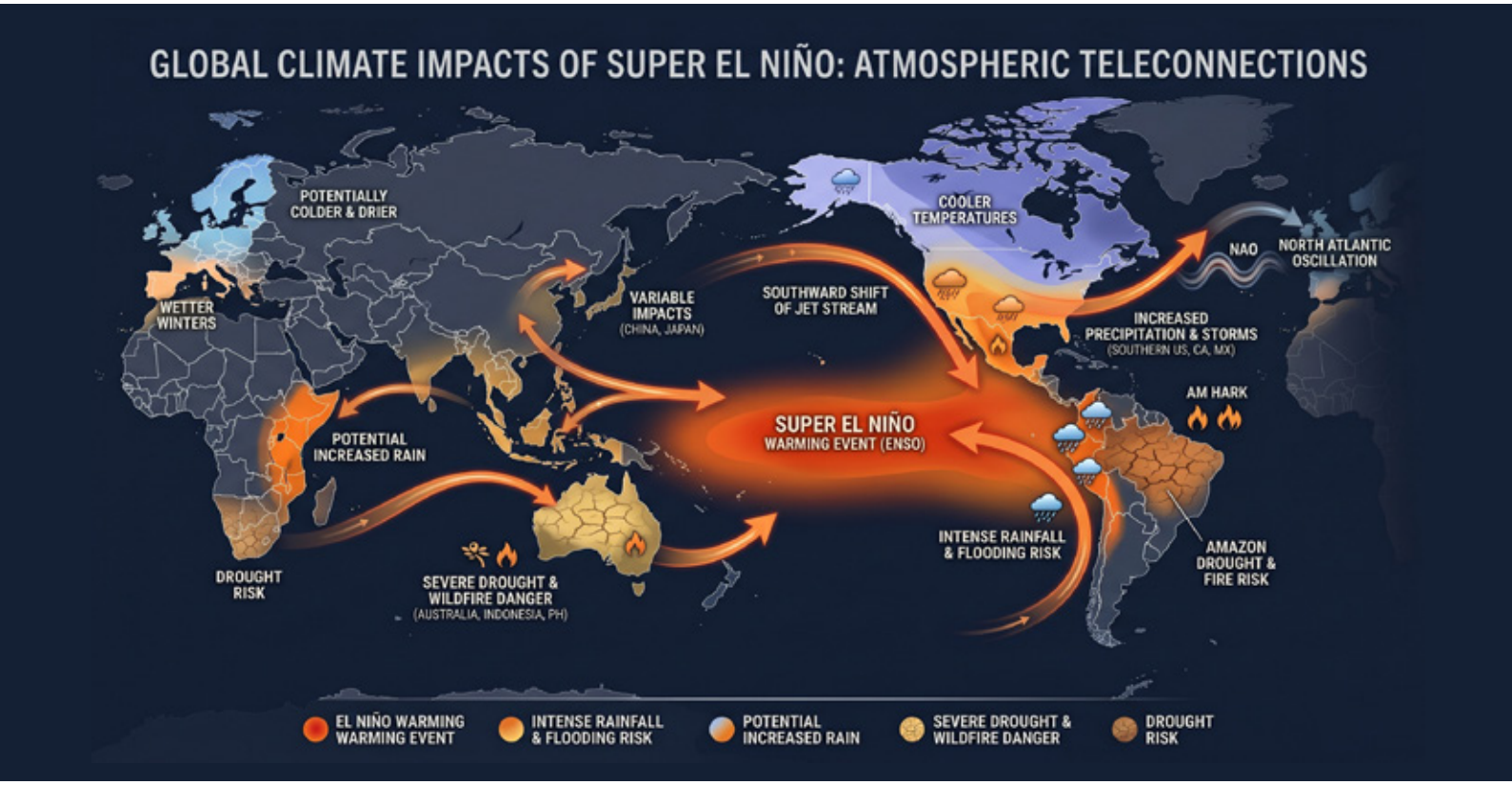
"The water recovered by fixing leaks may not be visible in a new reservoir, but it can make an immediate difference to the amount available for households, hospitals, schools, businesses and industry. These interventions are not glamorous. They rarely generate the excitement associated with announcing a major infrastructure project. Yet their importance is difficult to overstate."

The implications are significant. Every litre of water lost through a leaking pipe has already required abstraction, treatment, pumping and energy. It represents not only a loss of a scarce natural resource but also a financial and environmental cost.

Rand Water's climate resilience strategy therefore places considerable emphasis on water conservation and demand management.

Through initiatives such as Project 1600, the utility works with municipal customers to manage consumption, improve efficiency and reduce pressure on

El Niño is part of the El Niño–Southern Oscillation (ENSO), a natural climate pattern involving changes in sea-surface temperatures and atmospheric circulation across the tropical Pacific Ocean







1 Every litre of water lost through leaks has already required abstraction, treatment, pumping and energy. It represents not only a loss of a scarce natural resource but also a financial and environmental cost

2 Rand Water's long-term infrastructure development programme is designed to improve system reliability, increase operational flexibility and accommodate future demand

the bulk supply system. Technical support, data sharing, leak detection and pressure management are important components of this approach.

However, Mosai maintains that municipalities must take decisive action within their own distribution networks. "We are not going to overcome this period of time if we don't fix the leaks, because there's just no more water that comes into the system."

He has called for accelerated leak repairs, improved pressure management, enforcement of municipal by-laws and stronger action against illegal connections.

Water restrictions and responsible consumption must also become part of the response to climate-related supply pressures.

For Mosai, water conservation cannot remain an occasional campaign introduced during periods of drought. It must become a permanent feature of water management.

Building infrastructure for an uncertain future

While reducing water losses is essential, Rand Water recognises that climate resilience also depends on sustained investment in infrastructure.

Its long-term infrastructure development programme is designed to improve system reliability, increase operational flexibility and accommodate future demand.

Among its major investments are the 210 Mℓ Vlakfontein Reservoir and the Zuikerbosch Station 5A water purification plant, which adds 600 Mℓ/day of treatment capacity.

These projects demonstrate the importance of forward planning in a sector where major infrastructure can take years to design, finance and construct.

"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."

However, infrastructure resilience involves more than constructing additional capacity.

Rand Water's climate strategy includes designing infrastructure to withstand extreme weather, strengthening disaster management arrangements and maintaining critical assets to minimise the risk of operational failures.

Efforts to climate-proof Rand Water's assets, such as reinforcing pump stations against flood risks and installing energy-efficient equipment, ensure that the organisation is not only meeting current demand but is also prepared for future uncertainties.

Its maintenance programmes focus on pipeline integrity, pumping capacity, reservoir reliability and treatment plant performance.

The utility is also strengthening its use of monitoring systems and operational data to identify potential risks and respond more effectively to changing conditions.

Climate-related disruptions can affect several components of the water supply system simultaneously. A prolonged drought may reduce available raw water, while extreme rainfall can affect water quality and damage infrastructure. Electricity interruptions can further complicate pumping and distribution.

Building resilience therefore requires a system capable of adapting to multiple risks rather than responding to individual emergencies.

As Mosai previously observed: "There are no quick fixes in water. You plan, you operate, you maintain, and you reinvest."

Protecting water quality and diversifying supply

Climate change is not only a question of how much water is available. It also affects the quality of the water entering treatment plants.

Higher temperatures, altered river flows and extreme rainfall can influence sediment levels, microbial activity and pollutant concentrations in raw water sources.



Healthy rivers, wetlands and ecosystems support water quality, regulate flows and contribute to resilience against both droughts and floods

This makes catchment protection, water quality monitoring and treatment flexibility increasingly important.

Rand Water is strengthening its monitoring and data collection capabilities to identify changes in raw water quality and adjust treatment processes where necessary.

Research into emerging water quality risks forms part of its broader climate resilience strategy.

The utility is also exploring alternative sources of water, including groundwater and reclaimed water, as part of efforts to diversify supply and reduce dependence on conventional surface water resources.

Mosai believes that water reuse must receive greater attention. "We need to look at wastewater treatment works. We need to reuse water. There's no more fresh water that's going to come from the surface water."

Increasing the safe reuse of appropriately treated wastewater for suitable applications could reduce demand for potable water, support industrial activities and strengthen overall water security.

However, alternative water sources must be accompanied by appropriate treatment, monitoring, regulation and investment.

Protecting catchments is equally important. Healthy rivers, wetlands and ecosystems support water quality, regulate flows and contribute to resilience against both droughts and floods.

For Rand Water, climate adaptation must therefore extend beyond treatment works and pipelines to the natural systems on which bulk water supply depends.

Climate resilience requires collaboration

A central theme of Mosai's approach is that water security cannot be achieved by any single institution. Rand Water may be responsible for treating and supplying bulk water, but the reliability of water services ultimately depends on the performance of the entire value chain.

Municipalities must maintain distribution infrastructure, manage demand and enforce conservation measures. National government must support water resource planning and regulation, while water institutions, businesses and communities all have important responsibilities.

"We understand that water security cannot be achieved by a bulk water supplier alone. The challenge before us is much bigger than any institution. We need to strengthen collaborations across all players in the value chain, and most importantly, we ought to translate our collective knowledge and responsibilities into practical solutions," Mosai told delegates at the Gauteng dialogue.

Rand Water is strengthening its use of monitoring systems and operational data to identify potential risks and respond more effectively to changing conditions

This thinking is reflected in Rand Water's broader strategy to expand its involvement across the water and sanitation value chain. Through partnerships and special purpose vehicles, the organisation is seeking to strengthen municipal water services and support more sustainable operations. "Rand Water will never be sustainable if we only focus on bulk water production, we are no longer just a bulk water utility. We are a diversified water and sanitation service provider across the entire value chain."

Rand Water is also pursuing opportunities in energy generation, chemical production and alternative water sources to strengthen operational sustainability.

Mosai believes that fragmented approaches to water management are increasingly unsuitable for the challenges posed by climate change. He has called for clearly defined responsibilities, measurable commitments and consistent monitoring of implementation. The emphasis must shift from discussing problems to delivering practical solutions.

Turning climate risk into an opportunity

Although climate change presents considerable risks, Mosai believes it also provides an opportunity to accelerate reforms that the water sector has discussed for years.

"The need to reduce water losses, protect catchments, diversify supply, strengthen infrastructure and improve institutional collaboration is not new. What has changed is the urgency with which these interventions must be implemented. Rand Water has already reviewed its climate change policy and relevant operational processes to align with South Africa's Climate Change Act 22 of 2024," says Mosai.



Rand Water's approach combines adaptation measures, designed to strengthen resilience against climate impacts, with efforts to improve operational efficiency and reduce its environmental footprint.

However, Mosai emphasises that meaningful progress will require sustained commitment across the sector. "El Niño presents a serious test of our preparedness. But surprisingly for me, it presents an opportunity to implement the plans that we have crafted, we have talked about."

Ultimately, South Africa's ability to withstand future climate shocks will depend as much on how effectively it manages existing water resources as on its ability to develop new supplies.

For Rand Water, the priority is to ensure that every litre abstracted, treated and distributed is used as efficiently as possible.

Mosai's message to the sector is to move "beyond responding to the crisis, but building a lasting resilience".

With climate uncertainty becoming a permanent feature of water resource planning, the challenge is no longer simply to secure enough water for the next summer. It is to build a water system capable of sustaining communities, industry and economic growth for generations to come. "After all, water is the foundation of public health and our economy," concludes Mosai.

RAND WATER

www.randwater.co.za

WATER

THE ELEMENT OF RESILIENCE



At our recent WISA 2026 Biennial Conference and Exhibition, *Rethink Amanzi*, one message came through strongly: the water sector cannot thrive in isolation. **By Dr Lester Goldman, CEO, WISA**

Hydrogen and oxygen remind us of this truth. Each has its own properties, but when they come together, they form something entirely different: water, the essence of life. In Arabic, the word for water is *Mā'*. It is the most basic yet profound reminder of life's dependence on shared elements. In much the same way, professionals, institutions and communities need one another if we are to build a sector capable of meeting the challenges ahead. Partnership is not optional; it is part of what makes the sector resilient.

A friend recently introduced me to the concept of *Ma'ūn*, also from Arabic tradition. It refers to acts of assistance and provision, and to the idea that even small acts of help can have real value. I found the concept particularly relevant to our sector. Think of the process controller who keeps a treatment plant operating, often without recognition. Think of the researcher who shares knowledge and data. Or the municipality that supports a neighbour by lending expertise or experience. None of these actions may seem significant on their own, yet together they are part of what keeps the sector functioning.

Mā' reminds us of the physical foundation of life. *Ma'ūn* reminds us of the social and ethical foundation of resilience. Without that spirit of support, even the best strategies remain words on paper. With it, knowledge is shared, problems are solved and policy has a better chance of becoming practice. Support and collaboration are therefore not peripheral to sustainability; they are its foundation.

When responsibility is fragmented and institutions work in isolation, weaknesses multiply and communities carry the consequences. When people and institutions work together, strengths are shared, knowledge moves more freely and better solutions become possible.

The challenges facing the water sector are too complex for any one organisation, profession or community to solve alone. Climate volatility, ageing infrastructure, institutional weakness and unequal access to water all require different forms of expertise and, just as importantly, a willingness to work together. That requires trust, professionalism and ethical leadership.

The lesson of hydrogen and oxygen is simple: when the right elements come together something greater emerges. *Mā'* reminds us of the life created when elements combine. *Ma'ūn* reminds us that small acts of support build the trust on which larger systems depend. If we can make both concepts part of how we work across the sector, resilience will become more than an aspiration. It will become something we experience in practice, with professionals supporting one another, institutions collaborating and communities being better served as a result.

Ultimately, that is what a resilient water sector should look like: people willing to share what they know, institutions willing to support one another and a collective commitment to ensuring that water remains available, sustainable and secure for the generations that follow. ●



Southern Africa's water sector stands at a defining moment. Ageing infrastructure, deteriorating wastewater systems, water losses, skills shortages, climate variability and governance failures continue to threaten water security and public health. Yet, alongside these challenges lies an opportunity to rethink how we collaborate, invest and deliver services. **By Dr Ashton Busani Mpofu, chairman, WISA**



BREAKING SILOS: THE FUTURE OF WATER DEMANDS COLLECTIVE ACTION

Of the 848 assessed wastewater treatment works, the Green Drop Report found 396 in a critical state. Our sector must move beyond diagnosis and towards recovery with urgency. This requires more than infrastructure investment; it demands competent institutions, professional accountability, sustainable financing and consistent operational oversight.

Need for urgency

Climate change makes the need for action even more pressing. The South African Weather Service's August 2026 seasonal outlook indicated that El Niño conditions would continue through the 2026/27 summer, with below-normal rainfall anticipated across many areas. While El Niño does not guarantee drought, the prospect of hotter, drier conditions demands proactive planning, efficient water use, diversified supplies, groundwater management and investment in climate-resilient infrastructure.

As South Africa approaches the local government elections, water and sanitation must remain central to conversations about municipal performance and accountability. Communities deserve reliable services, transparent governance and infrastructure that is properly maintained. Regardless of political affiliation, ensuring sustainable water services must be a shared priority.

WISA's role

July 2026 brought renewed momentum to South Africa's water sector. The WISA Biennial Conference, themed Rethink Amanzi – Securing Our Future, and the subsequent release of the National Water Action Plan reinforced the need for investment, institutional reform, accountability and collaboration. The challenge now is to turn these commitments into tangible improvements in water and sanitation service delivery.

WISA has an important role in advancing this agenda. As a multidisciplinary professional body, we can connect government, municipalities, academia, industry, utilities and communities to share knowledge, strengthen skills and develop evidence-based solutions.

However, our greatest obstacle may not be a lack of expertise or ideas, but our continued tendency to work in silos. Water does not recognise institutional boundaries, and neither should our solutions. Collaboration must become the foundation of how we plan, finance, regulate and manage water and sanitation services.

As a new chairman

As Chair, my leadership philosophy is simple: listen with humility, unite with purpose, lead through service and deliver together. We must empower young water professionals while drawing on the experience of established practitioners, creating a profession that learns across generations and works collectively towards lasting impact.

Nelson Mandela reminded us: "The world remains beset by so much human suffering, poverty and deprivation. It is in your hands to make of our world a better one for all, especially the poor, vulnerable and marginalised." This is the responsibility our profession must embrace.

I invite every WISA member and water-sector partner across Southern Africa to turn knowledge into action, strengthen partnerships and champion accountability. Let us choose collaboration over competition, implementation over inertia and impact over individual recognition.

One Sector. One Purpose. One Future. Together, let us break silos, build partnerships and secure a resilient, inclusive and water-secure Southern Africa. ●







RETHINKING AMANZI: THE SUCCESS OF WISA2026

Every two years, the water sector, in all its variations, gathers under one roof for the WISA conference to share ideas, knowledge, technology, innovation and passion. In 2026, the event took place in Cape Town, a fitting setting for the theme: *Rethink Amanzi – Securing our Future*, as years before, the City of Cape Town had to do just that to move past its Day Zero.

As always, the conference was divided into subthemes; this iteration played host to eight dedicated tracts:

1. Rethink Capacity: Refocusing Efforts to Empower People
2. Rethink Infrastructure: Reimagining Water Infrastructure for a Resilient Future
3. Funding the Flow: Innovative Finance & Partnerships for Water Services
4. Rethink Efficiency: Driving Water Efficiency & Effectiveness Across Sectors
5. Smart Water Futures: Leveraging Digital Tools and the 4IR Revolution
6. Climate-Resilient Water Futures: Water Security in a Changing Climate
7. Rethinking Governance: Strengthening Institutions, Regulation & Accountability
8. Water for Life: Managing Water Quality & Quantity Across Catchments

Highlights include the Minister of Water and Sanitation, Pemmy Majodina's opening remarks, alongside the six keynotes: Refilwe Buthelezi from the Federation of African Engineering Organisations, Dr Inga Jacobs-Mata of the International Water Management Institute, Bothwell Manikai from the Development Bank of Southern Africa, Leonardo Manus from the City of Cape Town, and Wandile Sihlobo of the Agricultural Business Chamber of South Africa.

The conference was packed with technical tours, presentations, exhibitors, industry leaders, researchers, technical experts and emerging water professionals, all tackling the water sector's most pressing questions.

WISA 2026 in numbers

There were 97 exhibitors, 66 from South Africa and 31 international representing a total of 7 countries: South Africa, China, Germany, Sweden, Norway, the United States of America, and Canada. There were 12 parallel streams, with 150 presentations over the three days.

Pre-conference registration totaled 2118, with a 92% check in, with 1959 delegates attending the conference.

The WISA Gala dinner

The fully booked gala dinner was a smash hit, the perfect setting to gather with peers and celebrate the industry. WISA also handed out several awards.

Aqua Vita Est Award for Participation Structures

The Process Controllers Division received the Aqua Vita Est Award for Participation Structures, recognising its active contribution, engagement and commitment to advancing WISA's work. Dewald van Staden accepted the award on behalf of the division.





1 Dewald van Staden accepted the Aqua Vita Est Award for Participation Structures on behalf of the Process Controllers Division

2 Mr Dan Naidoo was presented with the prestigious Senior Fellow Award



3

Senior Fellow Award

Mr Dan Naidoo was presented with the prestigious Senior Fellow Award in recognition of his distinguished service, leadership and significant contribution to WISA and the broader water sector. We congratulate him on this well-deserved honour.

Celebrating excellence in student research

WISA 2026 celebrated the outstanding contributions of emerging water-sector researchers through its Student Awards.

3 WISA 2026 celebrated the outstanding contributions of emerging water-sector researchers through its Student Awards

Congratulations to Mphokuhle Aaron Dube, who received the Best Oral Presentation award, followed by Nizordinah Sithole in second place and Nomathamsanqa Francisca Manyisa in third. Sizakele Ndlovu received the award for Best Poster Presentation. These achievements reflect the knowledge, dedication and fresh thinking of the next generation of water professionals.

Passing the baton to Johannesburg

As WISA 2026 drew to a close, Cape Town officially passed the baton to Johannesburg, host city for the WISA 2028 Biennial Conference & Exhibition.

WISA offers a heartfelt thank you to every delegate, speaker, sponsor, exhibitor, partner, volunteer and team member who contributed to the success of this year's conference.

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THE CHEMISTRY BEHIND AFRICA'S WATER SECURITY



The Mobeni manufacturing operation has been established for more than two decades and is primarily dedicated to manufacturing Protea Chemicals' proprietary Zetafloc coagulant range

As Africa grapples with deteriorating raw water quality, increasing water scarcity and growing pressure on treatment infrastructure, effective coagulation and flocculation are more important than ever. Protea Chemicals' Water Care business is combining local manufacturing, innovative chemical formulations and technical expertise to strengthen water security across the continent.

As part of the Omnia Group, Protea Chemicals is responding to these challenges through its Water Care business, which supplies a comprehensive range of specialised chemicals for drinking water and wastewater treatment. Central to this offering is its locally manufactured Zetafloc range of coagulants, designed to meet increasingly complex water treatment requirements.

"Produced at our Mobeni facility in Durban, the Zetafloc range has built a strong reputation for quality, reliability and treatment performance. It's a renowned brand," says Joyce Jabane Bauwens, general manager of Water Care at Protea Chemicals.

Zetafloc includes highly effective polymeric coagulants,and inorganic coagulants, producing speciality blends with bespoke chemistries for specific water treatment requirements. Aluminium chlorohydrate acts as an effective binding component when combined with other coagulant chemistries, allowing Protea Chemicals to develop speciality blends tailored to specific water treatment requirements.

"The organic coagulants are more complex to manufacture because they require specialised polymer chemistry, precise control of chemical reactions and sophisticated manufacturing processes. Protea Chemicals Water Care is the only manufacturer of Dadmac Monomer in Africa, producing PolyDADMAC, a critical polymer for water treatment," explains Jabane Bauwens.

Zetafloc products are certified under NSF/ANSI/CAN 60 for use in drinking water treatment, providing independent assurance that they meet the applicable requirements for drinking water treatment chemicals.

Quality control begins with the raw materials themselves. "Protea Chemicals sources raw materials from both South African and global suppliers. All raw materials must meet strict specifications, adhering to drinking water standards. Suppliers cannot simply be onboarded without undergoing a verification process, ensuring that the materials used meet the Omnia and industry quality and certification requirements," adds Jabane Bauwens.

Strength in local supply

This stringent approach to quality control is reinforced by the company's local manufacturing capabilities. "A



Joyce Jabane Bauwens, general manager of Water Care at Protea Chemicals

key differentiator for Protea Chemicals Water Care is that we do not import our treatment chemicals. By manufacturing our own products, we have complete oversight of their chemical composition, quality and performance. We understand how they behave and react during treatment, allowing us to confidently stand behind their effectiveness," states Jabane Bauwens.

She adds that local manufacturing of water treatment chemicals is about more than supporting South African industry. "It is a matter of water security. Municipalities, water boards, mines and industrial operations depend on a continuous supply of chemicals to treat water, and any interruption can have serious consequences. As a local manufacturer, we have control over product quality, formulation and availability."

As global supply chains face geopolitical uncertainty, shipping disruptions and fluctuating raw material prices and availability, South Africa's ability to manufacture critical water treatment chemicals locally provides an important safeguard to Africa's water security.

Protea Chemical's manufacturing capability is supported by Omnia's procurement expertise, global supplier relationships and financial resources, strengthening its ability to maintain continuity of supply. Its reach extends beyond South Africa, supplying water treatment chemicals to customers across the African continent. The company exports to neighbouring countries, including Namibia, Botswana, eSwatini, Malawi and Zambia, and has an established presence West Africa.

Trends in flocculent and coagulant use

Protea Chemicals Water Care is seeing growing demand for application-specific coagulant formulations as customers move away from a one-size-fits-all approach. As the public and private sectors increasingly diversify their water sources through groundwater abstraction, desalination and water reuse, conventional off-the-shelf treatment chemicals may no longer be suitable in all instances. Different water sources present unique treatment challenges, creating a growing need for tailored chemical formulations that address specific water quality characteristics. Speciality and blended Zetafloc products provide a platform for developing solutions around these changing customer requirements.



The Zetafloc range has built a strong reputation for quality, reliability and treatment performance

Wastewater from different industrial processes can have vastly different chemical characteristics. Consequently, a coagulant that performs well in one application may be unsuitable for another.

One of the biggest changes facing water treatment plants is the increasing variability and complexity of raw water. Many plants were originally designed to treat water with relatively predictable characteristics. Today, operators must contend with seasonal changes, increased nutrient loading, algal growth, higher concentrations of organic matter and pollution from various sources.

Heavy rainfall can introduce significant quantities of suspended solids and organic material into rivers and dams, while drought conditions can concentrate contaminants and change water chemistry.

Jabane Bauwens says these changes are fundamentally influencing the development of coagulants. "The traditional approach of relying on a standard chemical throughout the year is therefore becoming less suitable for some treatment applications. Climate change, changing raw water characteristics, advances in raw material chemistry and increasingly stringent water quality requirements are all influencing this development."

Changing drinking water standards are also influencing the development of coagulant formulations. Polyamines, for example, are subject to strict controls relating to chemical impurities and permitted dosing levels because of the potential presence of residual substances such as epichlorohydrin.

For Protea Chemicals, this has created an ongoing need to develop and refine its formulations.

Jabane Bauwens says the Mobeni manufacturing operation has been established for more than two decades, during which time the Zetafloc portfolio has evolved considerably. Some formulations have been discontinued as market requirements changed, while new products have been developed to address emerging water quality challenges.

"The biggest part of our innovation is formulation, based on the quality of water, source of water you are treating, required treatment outcome and also reducing the cost of treatment. When we develop formulations, we don't cut corners – Zetafloc is a very strong brand," she says.

Looking beyond the price per kilogram

With chemical expenditure representing a significant operating cost for many treatment plants, procurement decisions frequently focus on the price per kilogram.

However, Jabane Bauwens argues that this approach can overlook the true cost of producing treated water. "Coagulation



Zetafloc products are certified under NSF/ANSI/CAN 60 for use in drinking water treatment, providing independent assurance that they meet the applicable requirements for drinking water treatment chemicals



A key differentiator for Protea Chemicals Water Care is that they manufacture their own chemicals locally

has an impact on the entire treatment process. The choice of coagulant can influence downstream treatment efficiency. A product with a higher purchase price may require a substantially lower dosage, making it more economical than a cheaper alternative."

Different coagulant chemistries can also influence sludge characteristics, ultimately affecting its handling and disposal requirements.

"Rather than focusing on price per kilogram of a product, consider the overall treatment cost that includes chemical consumption, operational performance, downstream treatment requirements and sludge management," says Jabane Bauwens.

She adds that simply increasing the dosage of an existing product is not always the best solution when water quality changes. "In some circumstances, switching to a different chemistry or introducing a speciality blend can deliver better performance at a lower overall cost. This is particularly relevant for municipalities and water boards seeking to optimise existing infrastructure and improve treatment efficiency without major capital expenditure."

The importance of getting the dosage right

Selecting the correct coagulant is only part of achieving effective treatment. Dosage optimisation is equally important.

Jabane Bauwens warns that both overdosing and underdosing can have significant operational and financial consequences. "Underdosing prevents sufficient particle destabilisation and floc formation, leaving more suspended material in the water. This places additional pressure on downstream filtration systems, which must remove particles that should have been captured earlier in the treatment process. Your filters have to do what should have been done at the coagulation stage."

Overdosing presents a different set of challenges. Apart from unnecessary chemical expenditure, excessive dosing can increase sludge production and, depending on the chemistry, contribute to elevated residual chemical concentrations in treated water.

For drinking water applications, maximum permitted chemical dosages are particularly important. NSF certification specifies maximum use levels for certified products, helping control potential chemical contaminants introduced during treatment.

Jabane Bauwens emphasises that regular optimisation is essential because raw water quality is not static.

Technical support beyond chemical supply

Protea Chemicals Water Care's approach to coagulation and flocculation extends beyond manufacturing and delivering products.

The company works closely with plant operators to assess raw water characteristics, select appropriate formulations and optimise chemical dosing.

Before recommending a coagulant, its technical teams typically evaluate parameters such as turbidity, pH, alkalinity, suspended solids, organic matter and colour .

Potential products and dosages are then assessed through jar testing where different chemistries and dosages to be compared according to floc formation, settling behaviour and resulting water quality.

Where a new product demonstrates improved performance, further plant trials can be undertaken before full implementation.

Much of Protea Chemicals' sales and technical team comprises engineers and professionals with practical water treatment experience, including individuals who have operated treatment plants.

Jabane Bauwens, herself a chemical engineer , believes this experience is essential when recommending changes to established treatment programmes.

"Credibility is everything. The bulk of our sales team comes from this industry. Some of them operated the plants, so we have that credibility that gives a customer comfort."

Regular technical engagement allows dosing programmes to be adjusted as raw water conditions change, helping plants maintain treatment performance while controlling chemical consumption.

As Africa faces mounting water security challenges, Protea Chemicals is drawing on its local manufacturing capabilities, formulation expertise and technical support to help treatment plants produce more water, more efficiently, from increasingly challenging sources.

Jabane Bauwens believes that water treatment chemicals should increasingly be recognised as a strategic component of water security rather than simply a consumable purchased on price. "Ultimately, effective coagulation and flocculation is not simply about removing particles from water. It is about protecting downstream infrastructure, reducing operating costs, improving treatment reliability and ensuring that more water can be treated safely from increasingly challenging sources."

And for Jabane Bauwens, maintaining South Africa's ability to manufacture the chemicals that make this possible is fundamental to Africa's long-term water security. ●

WATER CHEMISTRY MATTERS IN BOILER PERFORMANCE

Poor water chemistry can quietly undermine boiler performance, increasing energy consumption, accelerating corrosion and shortening equipment lifespan. **Kirsten Kelly** talks to the Allmech managing director, **Lionel Maasdorp** about the chemistry behind an efficient boiler.

Boilers are used across a wide range of industries, from food manufacturing and hospitals to mining and industrial processing. Although their applications differ, they share a common challenge: the quality of the water entering a boiler can have a significant impact on its performance, efficiency and lifespan.

One such problem is scale. Water naturally contains dissolved minerals such as calcium and magnesium. When heated inside a boiler, these minerals can precipitate out of solution and accumulate on heat-transfer surfaces, forming hard deposits known as scale.

"Calcium and magnesium create an insulating layer on heat-transfer surfaces, that restricts the movement of heat into the water. The result is a boiler that requires more energy to produce the same amount of steam, increasing operating costs and potentially contributing to equipment damage," explains Lionel Maasdorp, managing director of Allmech.

Softeners

Allmech addresses this challenge through water softening systems that remove calcium and magnesium before water enters the boiler. "Water softeners use ion-exchange technology, the system contains specialised resin that is negatively charged. The resin releases sodium into the water and then attracts and holds onto the hardness-causing minerals. Once the resin reaches its capacity, it is regenerated using a salt solution, allowing the process to start over again. By reducing water hardness, softeners prevent scale formation, improve heat-transfer efficiency and protect boiler components," says Maasdorp.

However, he cautions that water softening alone cannot guarantee complete protection. "Sometimes there is a little slippage. The resin might be getting old, or an O-ring might be leaking," he explains. This is where other chemical treatment becomes essential.

Allmech supplies a range of specialised water treatment chemicals associated with heating and cooling systems and boilers of all types.



Lionel Maasdorp, managing director, Allmech

Designing a water treatment programme for boilers

One of the most common misconceptions Maasdorp encounters is that a single chemical treatment programme will work equally well across different boiler installations. "One size does not fit all."

Light scale formation on electrodes



Excessive scale on electrodes





Duplex softener with brine and chemical tanks



Borehole water hardness can vary between wet and dry seasons

In reality, developing an effective water treatment programme requires a detailed assessment of the boiler, its operating conditions and the quality and quantity of water being used as well as the product the steam is being used to produce. The food and beverage industry must use SANS 1827 compliant chemicals, whereas other industries can use a greater range of chemicals that are not food-safe like anti-corrosion foam for pipes.

"We need to understand what type of boiler the customer has, how much water it uses per day and the maximum amount of water it might need within a single hour," adds Maasdorp.

Steam demand can fluctuate dramatically during industrial production. A boiler might initially produce one tonne of steam per hour while a plant warms up, before demand increases to 20 tonnes per hour as additional production processes come online. Once the required temperatures have been reached, demand may decrease again.

These variations must be considered when sizing the water softening equipment.

Water quality is equally important. Allmech typically requests a water analysis to establish parameters such as hardness, pH, sodium, iron and manganese concentrations.

Iron and manganese can interfere with the performance of softener resin, while the hardness of the incoming water determines how frequently the system must regenerate.

The treatment programme must also account for condensate recovery.

"Condensate is water that has already been heated. If you can return it to the boiler, you do not have to heat that water from scratch again," Maasdorp explains.

Recovering condensate therefore reduces both the demand for fresh make-up water and the energy required to produce steam.

Because the recovered condensate does not need to pass through the softener again, the volume of make-up water requiring softening may be considerably lower than the total volume circulating through the boiler system. However, condensate water does still need to be treated by other chemicals.

This distinction influences equipment sizing and chemical consumption.

Chemicals

In addition to softeners, Allmech provides a vast range of other water treatment chemicals. Their blend of chemicals contains an oxygen scavenger, reducing dissolved oxygen that could otherwise contribute to corrosion.

Polymers are also incorporated into boiler water treatment programmes to keep particles dispersed, allowing them to be removed through boiler blowdown. As water is heated and converted into steam, dissolved minerals and other impurities become increasingly concentrated in the boiler. Polymers work by preventing fine particles from clumping together and adhering to surfaces, keeping them suspended in the water instead. These impurities can then be removed through a process known as boiler blowdown, where a controlled volume of water is discharged in short bursts from the boiler to remove accumulated solids.

"Blowdown is not wasted water. There is the incorrect perception that reducing boiler blowdown will automatically save money. Without adequate blowdown, solids can accumulate, form sludge and deposits and interfere with heat transfer, significantly impacting on energy efficiency, and creating expensive maintenance problems in the long term," explains Maasdorp.

The risks of incorrect chemical dosing

While chemical treatment protects boilers, Maasdorp emphasises that dosing must be carefully controlled.

Insufficient chemical dosing can leave dissolved oxygen in the boiler water, increasing the risk of corrosion. Excessive dosing can create a different set of problems.

Some boiler treatment formulations contain caustic components that raise the water's pH to help maintain appropriate operating conditions. However, excessive caustic concentrations can contribute to caustic corrosion, potentially damaging boiler components and welds.

The compatibility of different treatment chemicals must also be considered.

Maasdorp explains that chemicals formulated using different treatment approaches may not necessarily work effectively together.

The materials used in the system are another important consideration. For example, aluminium components will



Boilers serve industries ranging from food manufacturing and healthcare to mining and industrial processing



Inadequate blowdown causes sludge and deposits to build up, reducing heat transfer and energy efficiency

typically corrode with pH levels higher than 9 while iron components will corrode with lower pH levels.

This is why Allmech assesses the complete installation before recommending a treatment programme rather than simply supplying chemicals based on the boiler's size.

"Furthermore, Allmech offers onsite water testing and monitoring services at intervals ranging from weekly to monthly or quarterly, depending on the customer's requirements," states Maasdorp.

Monitoring before problems become visible

Signs of boiler water treatment problems can develop before obvious physical damage becomes apparent.

According to Maasdorp, changes in pH, water colour, iron concentration and chemical residuals can provide early indications that the treatment programme is moving outside its required operating parameters.

Allmech also monitors the relationship between M and P alkalinity, which provides additional information about boiler water chemistry. M is the total alkalinity of water down to a pH of approximately 4.5 while P measures the alkalinity of water down to a pH of approximately 8.3.

Monitoring these parameters help establish the correct dosage levels of chemicals, such as whether sufficient oxygen scavenger is present, whether the chemical treatment is maintaining the required conditions and whether corrective action is necessary. This allows treatment programmes to be adjusted as operating conditions change.

Changing water sources creates new challenges

As more South African businesses invest in alternative and backup water supplies, boiler water treatment programmes must increasingly accommodate changes in incoming water quality. Some facilities alternate between municipal water, borehole water and other sources depending on availability.

While this improves water supply resilience, it can complicate the management of water softening systems.

Maasdorp explains that borehole water hardness can vary seasonally, with changes occurring between wetter and drier periods. The frequency of regenerating softeners will therefore vary according to the season. "Before using borehole water in a boiler, iron, manganese and calcium levels must be assessed and if necessary, treated. Sometimes customers only have water softeners for municipal water supply and they need a larger softener for borehole water supply. If a softener needs to be regenerated in a time frame that is shorter than eight hours, the salt will not have enough time to dissolve into a brine solution and become saturated, reducing the capacity of the softener. But often using borehole water only requires a mild adjustment to the existing water softener system."

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The Mali installation includes 10 systems, with production capabilities that vary between 2.5 and 5 kg/h

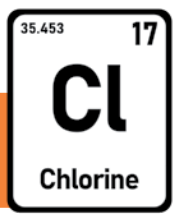
SECURING AFRICA'S CHLORINE SUPPLY ONSITE

Reliable access to chlorine – one of the most widely used water treatment chemicals – is essential to making water safe. Yet much of Africa relies on imports vulnerable to production and transport disruptions. While South Africa is one of Africa's few chlorine producers, its ageing plants can leave regional supply vulnerable.

In 2022, South Africa nearly experienced a potable water crisis due to chlorine shortages caused by port congestion and pandemic related logistics that delayed the supply of imported raw materials needed for local chlorine production. Technical failures at the country's primary manufacturing facility then further compounded the problem. These supply disruptions relegated smaller South African municipalities and other African countries to the back of the queue for chlorine.

"Fortunately, the crisis was averted. However, the incident highlighted the vulnerabilities of regional chlorine supply. Events such as the Covid-19 pandemic, the Suez Canal blockage and recent tensions around the Strait of Hormuz can further add to the fragility of global supply chains," says Tom Homan Free, managing director of ProMinent South Africa.

Reliable access to chlorine – one of the most widely used water treatment chemicals – is essential to making water safe



Onsite chlorine generation

He adds that there is a solution – onsite chlorine generation – allowing operators to produce sodium hypochlorite from salt, water and electricity. "Onsite chlorine generation, also known as salt electrolysis or electro-chlorination, is a simple process where an electrical current passes through an electrolysis cell, separating the sodium and chlorine components of the salt. The sodium component has a positive charge and is therefore attracted to the negative electrode while the chlorine molecule has a negative charge and is therefore drawn to the positive electrode. These react in the water to form sodium hypochlorite, a liquid disinfectant that can be dosed directly (via a dosing pump) into the treatment process."

Sodium hypochlorite produced in a low concentration requires no specialised equipment for handling and is easy to accurately dose into the water.

There are different technologies that can be used for onsite chlorine generation. A membrane-separated cell produces a purer, more concentrated solution and operates efficiently, but is more sensitive to operating conditions. It is often suited in applications such as food and beverage processing, where close control of chlorination byproducts is important.

Open-cell technology produces a lower-concentration solution but is robust, making it well suited to many potable water applications and sites where simplicity and reliability are priorities.

Looking beyond the chemical price

Homan Free states that a procurement department may dismiss onsite chlorine generation because it only focuses on the base price of chlorine gas (the cheapest source of chlorine), without factoring in the operational and financial risks of supply failure, the capital expenditure



Tom Homan Free, managing director, ProMinent South Africa



needed for the storage of the entire chlorine gas system, additional equipment for dosing, transport costs as well as safety equipment.

"Many industrial sites have in fact banned chlorine gas from their sites due to the safety risk. Sites that store chlorine gas need expensive safety equipment as well as yearly safety training, gas alarms and evacuation procedures," he adds.

The onsite generation of chlorine does not create chlorine gas. There are no high pressure cylinders or possibility of deadly gas escaping from a pipeline. While the onsite generation of chlorine will always require the use of personal protective equipment, a safer, low-concentration sodium hypochlorite solution is produced (0.9% up to 12.5%). Sodium hypochlorite is generated as it is needed and therefore there is no need to store large volumes. There is no need for highly skilled operators as the system is fully automated.

Use cases

"The uptake for onsite chlorine generation has been slow as for the most part, chlorine has always been readily available. It is one of the cheapest chemicals and can come in powdered form, liquid form, gas form. So if one form is not available, there is most of the times another alternative," explains Homan Free.

But rising material costs, transport costs, safety issues as well as the risk of supply disruptions has made onsite chlorine generation viable. ProMinent has supplied Mali, Angola, Mauritius, and soon Tanzania with onsite chlorine generation systems.

Homan Free rejects the perception that on-site chlorine generation is a new or untested technology. He cites Mali, where water operators have used locally generated chlorine for decades to reduce their dependence on chemical deliveries. ProMinent recently replaced older French systems and installed five units in and around the capital.

"Mali decided it wanted to be independent," he says. "Salt is easy to obtain as a precursor, and the operators did not want to depend on chemical deliveries."

In Mauritius, increasingly constrained freight routes and rising import prices helped justify investment in on-site generation. ProMinent also supplied a containerised production unit that generates sodium hypochlorite for distribution across the islands.

Angola presents another model, with generated sodium hypochlorite bottled and distributed to other users.

ProMinent has about 20 installations operating across the African continent and over 3 500 systems globally. The South African business employs a team of 23 in Johannesburg, including five service engineers qualified to maintain the systems, and supports installations throughout sub-Saharan Africa. Teams travel to countries including Mali, Mauritius and Angola for commissioning and scheduled servicing.

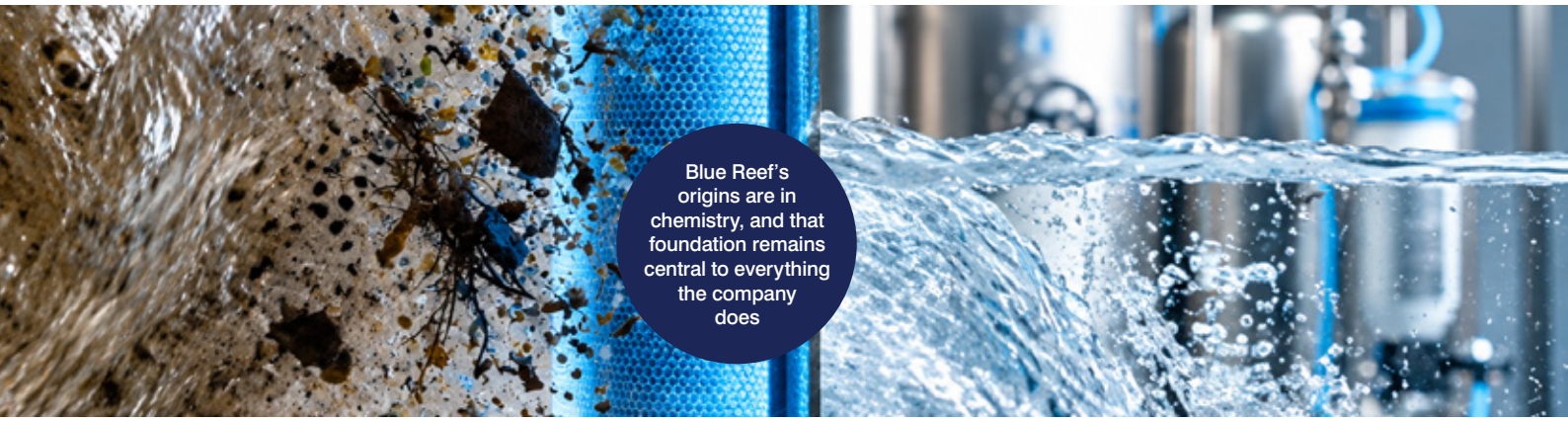
ProMinent added salt electrolysis to its wider water disinfection portfolio when it acquired Dutch chlorine electrolysis specialist Van den Heuvel Watertechnologie in 2008. The technology has since been applied in swimming pools, industrial facilities and large municipal potable water systems internationally.

The case for change rests on proven reliability, low operating costs, improved safety and greater control over a chemical essential to public health. "The common misconception is that this is new technology and has not yet been applied at a large municipal potable water scale. Onsite chloring generation has existed for a very long time, and there are cities like Paris and Prague around the world that run their complete municipal potable water disinfection systems on salt electrolysis systems," concludes Homan Free.

For a chemical essential to public health, on-site generation offers Africa a proven path towards greater water treatment security and independence. ●



An onsite chlorine installation in France comprising three, 10kg/h production systems



REDEFINING WHAT A WATER COMPANY LOOKS LIKE

Water is an irreplaceable resource across every sector of the economy, from manufacturing and industrial processes to hospitality and essential community services. Whether cooling machinery, treating effluent, powering boilers or supplying households, water underpins daily operations. Managing it efficiently is not simply a sustainability priority. It is a business necessity.

Blue Reef Water Solutions understands this better than most. Founded in 2013 and headquartered in KwaZulu-Natal, Blue Reef has grown from a speciality water treatment chemicals business into a full-service water solutions provider operating across South Africa and into sub-Saharan Africa. In just over a decade, the company has built a reputation grounded in technical rigour, proprietary chemistry, and a commitment that is simple to state but demanding to deliver: a measurable improvement at every client site. That commitment is reflected in a track record few providers in the sector can match – not a single customer lost in ten years.

From chemistry to complete solutions

Blue Reef's origins are in chemistry, and that foundation remains central to everything the company does. The company's in-house formulation capability – built on proprietary Hexamer Technology – produces a range of speciality dispersants, anti-scalants, scale inhibitors, biocides, coagulants, and flocculants that consistently outperform commodity alternatives at equivalent or lower dosing rates. These are not off-the-shelf products relabelled and resold. They are developed, tested, and refined by Blue Reef's own technical team.

This chemistry underpins a treatment scope that spans the full water cycle: boiler water internal treatment, cooling tower chemistry, potable water pre-treatment, effluent and process water management, reverse osmosis and nanofiltration systems, and water security infrastructure including borehole development and purification. Blue Reef treats in excess of 90 billion litres of water per year across its client base – a figure that reflects both the scale of the company's reach and the breadth of applications it serves.

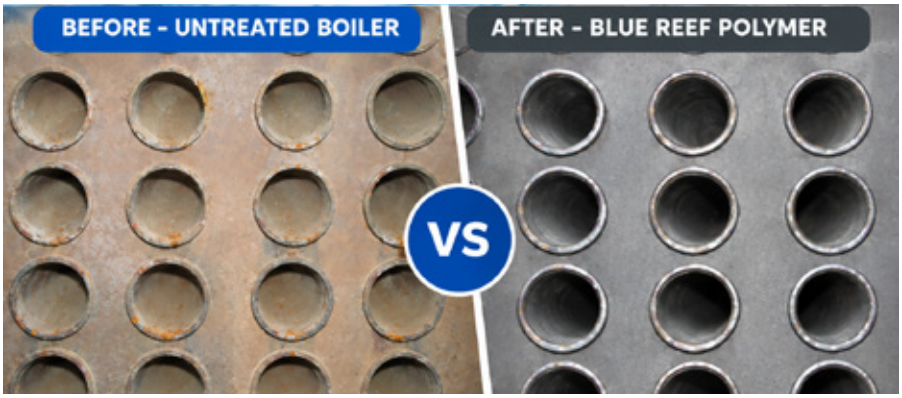
NSF International accreditation, certification to SANS 1827, SANHA Halaal certification, ISO 9001:2015 certification through TÜV Rheinland, Level 1 B-BBEE contributor status, and membership of the Water Institute of Southern Africa (WISA) are not marketing tools. They are the evidence of a quality management system that takes its obligations seriously – to clients, to regulators, and to the environments in which Blue Reef's chemistry is applied.

A technical partner, not a product supplier

The distinction Blue Reef draws most consistently is between being a chemical supplier and being a technical partner – one that shapes every aspect of how the company engages with clients.

Every new client relationship begins with a site assessment. Blue Reef's team of technically qualified account managers and specialists conduct surveys, review existing treatment programmes, assess system performance data, and design treatment approaches specific to that site's water chemistry, operational demands, and compliance obligations. Where problems are identified – scale build-up reducing boiler efficiency, biological risk in a cooling tower, high municipal water costs making a borehole development commercially viable – Blue Reef tables a solution with quantified outcomes.

That engagement does not end at installation or first chemical delivery.



Blue Reef has solutions to prevent scale build-up that reduces boiler efficiency

Ongoing monitoring, periodic site visits, system performance reporting, and proactive intervention when early warning indicators shift are part of the standard service model. Clients do not manage their water alone.

Serving every water challenge across every sector

Blue Reef's commercial structure reflects the breadth of its technical capability, operating across three distinct service portfolios.

In thermal and process water, Blue Reef manages the chemistry of boiler and cooling systems – the workhorses of manufacturing, food processing, and industrial production. Scale, corrosion, and biological fouling in these systems are not merely inefficiencies; left unmanaged they translate directly into energy losses, equipment failure, and unplanned downtime.

In industrial wastewater and effluent treatment, the focus shifts to what leaves a site. Blue Reef designs and implements treatment programmes that bring effluent into compliance with discharge consents and reduce chemical oxygen demand and biochemical oxygen demand loads. There is a strong focus on water recycling and reuse, with programmes geared towards zero liquid discharge – lowering both environmental impact and water consumption. For effluent and sewer streams, real-time monitoring technology gives plants live visibility of their compliance position – so a deviation is caught before it becomes a discharge event.

In water security, Blue Reef addresses the growing need for businesses to take an active role in managing their own water supply – complementing municipal infrastructure with independent, reliable alternatives. The company delivers end-to-end water independence; from geohydrological feasibility assessments, borehole drilling, and water use licence application management, through to the design and installation of purification infrastructure using nanofiltration, reverse osmosis, and other speciality treatment technologies. For clients evaluating the investment, Blue Reef's trailer-mounted NF demonstration unit deploys directly to site, treating real feedwater under real conditions – so decisions are based on verified performance, not laboratory projections.



Blue Reef's technical specialists assess water chemistry, treatment programmes and system performance to develop site-specific solutions that meet operational and compliance requirements

Proven in the field

Blue Reef's capabilities are best illustrated by what has already been delivered. At a manufacturing facility, Blue Reef designed and installed a closed-loop water recycling system that has operated automatically since 2022. The system recycles up to 19 000 litres per hour, returning 84% of process water directly back into operations, achieving compliant effluent discharge, and significantly reducing municipal water dependency for that process. This is one of many projects Blue Reef has delivered across industries and provinces. Each one is an operational installation built around the specific needs of that site.

Blue Reef operates as a member of the Deneb Investments Limited group of companies, itself part of the Hosken Consolidated Investments (HCI) portfolio and is one of South Africa's most established diversified investment groups. This group structure provides Blue Reef with financial stability, governance, and institutional backing that gives clients confidence in the company's long-term commitment to the market. It also means Blue Reef clients can access complementary expertise across waste management, speciality chemicals, and energy recovery through the broader group. Clients have access to an integrated sustainability offering that extends well beyond water treatment alone.

South Africa's water challenges are well documented – rising municipal tariffs, ageing infrastructure, supply restrictions, tightening discharge regulations, and growing demand from an expanding industrial and population base. None of these pressures are easing.

Blue Reef was built for exactly this environment. A company that manufactures its own chemistry, conducts its own site assessments, designs its own treatment programmes, and stands behind measurable outcomes at every client it serves. One that has spent over a decade building the technical depth, the accreditations, and the client relationships to be more than a supplier.

Water is everyone's business. Blue Reef makes sure it is managed like a business.



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To find out how Blue Reef can improve your water systems, reduce operating costs, or secure your water supply, contact us at info@bluereef.co.za or +27 (0)31 910 7500

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WHO SAFEGUARDS WATER AFTER IT CROSSES THE MUNICIPAL METER?

Irregular municipal water supply has sharply increased demand for tanks, boreholes and hybrid backup systems. Yet the rules governing their design, operation, maintenance and monitoring have not kept pace, creating potential blind spots in water quality, public-health protection and the hydraulic integrity of municipal networks. **By Kirsten Kelly**

Municipal back-up water systems are permanent systems that keep water available when the normal municipal supply is interrupted. They include storage tanks connected to the municipal network, booster pumps, boreholes, rainwater harvesting systems and hybrid systems that may use more than one water source. They may also include community storage, small treatment units and dual-reticulation systems. Despite the name, these systems are often owned by households, businesses or institutions rather than municipalities.

"Globally, municipal water supply backup systems are designed as part of urban resilience and risk management strategies. They are designed into the formal infrastructure, subject to ongoing monitoring and are often integrated into water safety plans. However, in South Africa, post-meter privately owned, permanently installed systems fall between the cracks of national legislation and the municipal bylaws. There are no operational maintenance or monitoring obligations for individual, private storage systems. Stored water is often introduced into buildings, often without any monitoring or treatment in place," explains Norah Motha – the CEO of Cubic M Africa and a project manager for a Water Research Commission (WRC) study dealing with the issue.



Norah Motha, CEO, Cubic M Africa and project manager of the WRC study



Ayesha Laher, director of AHL Water and the technical lead for the WRC study

A post-meter oversight gap

Once water passes through the municipal meter, regulatory oversight stops.

"The Constitution establishes the right of access to sufficient water and assigns potable water supply and domestic sanitation services to local government. Although it establishes a clear public supply mandate, it fails to anticipate or provide specific mechanisms for decentralised systems for private storage systems. The National Water Act frames water conservation to encompass storage interventions as a strategic demand management tool. It regulates water resources and alternative abstraction, including many groundwater uses. Depending on the type and scale of use, abstraction may be permitted as an existing lawful use or a general authorisation, or it may require a water-use licence. But there is no licensing framework for the private storage of treated municipal water," states Ayesha Laher, director of AHL Water and the technical lead for the WRC study.

She goes on to say the recent amendments to the Water Use License conditions necessitates municipal

approval for use of ground water. "This means that private users seeking to develop alternative water supplies, such as groundwater boreholes, require municipal approval as part of the national authorisation process. The requirement could have significant implications for households, businesses and institutions seeking reliable back-up water supplies, particularly where municipal approval processes are unclear or lengthy."

The Water Services Act places obligations on water service authorities to provide water services and promulgate bylaws. "The Act delegates the localised policing of private infrastructure entirely to municipal bylaws. The focus is on public infrastructure, there are no explicit operational and monitoring duties relating to the installation, connection to municipal supply, inspections and enforcements for individual private storage systems," adds Laher.

To add further complexity, the management of bylaws in a municipality



are often fragmented between different departments, with little enforcement of bylaws. Many municipalities also face resource and technical capacity constraints.

Building regulations provide important safeguards at the installation stage, particularly for backflow prevention and cross-connection control. Building control officers can inspect building works during construction against mandatory standards for water services SANS 10400. There are also a number of voluntary standards like SANS 10252 Part 1: Water supply installations for buildings. But these voluntary standards

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must be incorporated into bylaws to ensure compliance

Unfortunately, the current framework is more effective at checking new construction than monitoring the continuing operation and maintenance of a system inside an occupied property. Routine inspection is also constrained by the constitutional right to privacy, which limits access to private premises without consent or appropriate legal authority.

"There is a conundrum whereby one has a constitutional right to a sustainable supply of water. However, municipal bylaws may restrict the storage of water or the use of alternative sources such as groundwater. This creates a difficult policy tension. Municipalities must protect shared water resources and distribution networks, while consumers need lawful ways to maintain access to sufficient water during prolonged interruptions. As supply disruptions become more widespread, the balance between municipal regulation, private resilience and the constitutional right of access to sufficient water is likely to face growing public and legal scrutiny," explains Laher.

The Water Research Commission study

It is this tension that a new Water Research Commission (WRC) study - Towards safe and regulated municipal backup water supply systems in South Africa – aims to examine. By building evidence on how these systems are designed, operated and maintained, the research will support safer practices and clearer regulation.

An initial survey will cover at least 50 systems across three settings: 20 residential, 15 commercial and 15 institutional. The team is seeking participation in Gauteng as a starting point, while welcoming suitable systems elsewhere in the country.

Field assessments will examine system configuration, storage volume, operation, maintenance and user behaviour. Water will be tested for microbiological and chemical indicators, including *E. coli*, faecal coliforms, pH, chlorine, phosphate, nitrate and selected metals. The results will be benchmarked against South Africa's drinking-water quality requirements to establish a baseline for stored water safety.

This distinction is important. A municipal supply may meet the required standard at the point of delivery, but water quality can change if it remains in a poorly maintained tank, loses its disinfectant residual or is exposed to contamination within a private system. The study is intended to determine the scale and nature of those risks rather than assume that every stored-water system is unsafe.

Testing will continue until September 2027. Researchers will then assess the relationship between system characteristics, operational practices and water quality, allowing risks to public health, water supply and building infrastructure to be identified and prioritised.

South Africa can no longer treat private back-up water systems as isolated household or business decisions. As their use expands, they increasingly form part of the broader water supply network and must be managed accordingly. "The aim should not be to discourage resilience, but to ensure that resilience measures do not introduce new risks or undermine equitable access. Clear technical standards, practical monitoring requirements and coordinated regulation are therefore essential to ensure that private resilience strengthens, rather than compromises, public water security," maintains Motha.

PROJECT OUTCOMES OF THE WATER RESEARCH COMMISSION STUDY

1) Document the types, configurations and market drivers of back-up water systems, including their prevalence, user behaviour and potential effects on municipal distribution networks.
2) Evaluate their design, operational efficiency and performance across residential, commercial and institutional settings.
3) Assess the microbiological quality of stored water against SANS 241:2025 drinking-water requirements.
4) Identify risks to public health and infrastructure arising from poorly managed or unregulated systems.
5) Analyse the regulatory environment and identify gaps in by-laws, standards and enforcement and public awareness mechanisms.
6) Develop evidence-based technical guidelines, regulatory recommendations and public-awareness strategies

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FIRE PROTECTION ASSOCIATION OF SOUTHERN AFRICA

SIZING WATER STORAGE FOR REAL-WORLD SECURITY



Water security is more than installing a reservoir and hoping it is the right size. The correct water storage reservoir depends on historical consumption, operational requirements, supply reliability, replenishment rates, and the consequences of an interruption.

According to operations manager of Rainbow Reservoirs, Paul Warrener, the starting point should be a clear understanding of baseline consumption and the critical operational threshold, the minimum volume required to keep essential operations running. Other considerations include supply infrastructure, recovery times, and the rate at which alternative sources can replenish the reservoir. "It is all about understanding your needs and context. Is it just household water? Then you can almost survive quite happily on 10–15 litres for drinking water. But if it is a factory and its people's livelihood, it becomes measuring safety issues, fire response, and operations."

A key consideration is days of autonomy: how long an organisation needs to remain operational if its normal water supply fails. The appropriate figure varies according to location, reliability, and the consequences of an outage. A relatively reliable municipal system experiencing occasional maintenance interruptions might require two to three days of storage, while areas with chronic infrastructure problems may require five to seven days. Critical infrastructure such as healthcare facilities requires a more conservative approach. Warrener notes that hospitals can work towards as much as 14 days of autonomy because water is essential for drinking, sanitation, cleaning, and healthcare. Warrener adds, "It is about assessing what you need to do, what you can't do, and what you can afford to do."

Plan for peaks, not averages

Organisations should base reservoir sizing on actual consumption rather than assumptions. Warrener recommends collecting at least a year's worth of utility bills and smart-meter data. However, average consumption alone is not enough. "What's more important is the peak versus the average," he says.

An organisation might use 1 000 litres a day on average, but that figure can become misleading if certain days involve significantly higher demand. "If you do that, then your backup will be 2 000 litres, for example. But you have not calculated in your peak movements, so the average is not enough." The reservoir must therefore be able to supply peak demand, including periods when several water-intensive activities occur simultaneously. "Plan for peaks, not averages," adds Warrener.



Paul Warrener, operations manager of Rainbow Reservoirs

This also affects the reservoir's outlet and flow rate. A tank may contain enough water but fails to meet demand if its outlet cannot deliver enough flow. "If you have a small outlet, then you do not have the flow rate to do two water-intensive activities at the same time. In a factory, for example, you cannot clean machinery and flush a toilet at the same time if you have not planned for flow rate," explains Warrener.

There is no universal safety margin. Rainbow Reservoirs typically add around 15–25%, although the appropriate allowance depends on the organisation, buyer, and cost. "It's company-specific how much backup you need, and how much money you're willing to spend at that time for just in case."

Different users, different requirements

There is no single formula for residential developments, hospitals, mines, and factories. The calculation depends on the nature and scale of the operation. Warrener notes that households can plan for approximately 250 litres per person per day, while hospitals can be calculated according to beds and theatres, at approximately 300–500 litres per bed per day. Industrial requirements depend largely on the size and nature of the operation.

For critical facilities, priority should be distinguished between essential and non-essential water use. "Non-essential

operations must be aggressively shut down," says Warrener. Essential requirements include drinking water, sanitation, fire protection, cooling, and core operations. Irrigation, vehicle washing, and other discretionary activities are not operationally significant, so they have to be stopped in the event of backup water use.

This requires organisations to be honest about what they actually need. "You have to be honest with yourself, with your needs. What are the requirements that you have, and what is your usage now?" If requirements are underestimated, the reservoir may be inadequate when needed.





Storage size is determined by context and Rainbow Reservoirs assists clients to find the optimal storage for their context

Reliability changes the calculation

Historical supply reliability also determines how storage should be designed. An occasional 24-hour interruption is fundamentally different from recurring multi-day outages. "If it's a day every now and then, you almost treat it like a balancing challenge," Warrener says. In such circumstances, a two-day buffer may be sufficient.

"Multi-day outages change the entire engineering requirement." The reservoir begins to function less as a short-term buffer and more as a primary source of water, including operational continuity and safety.

This is particularly important because a stated interruption time does not necessarily mean that normal water supply will return after it is over. Once major reservoirs are emptied, downstream pipes also need to refill and pressurise. "It is not just the reservoir; it is actually all the pipes that are leading into residential areas. If an outage is 24 hours, it may feel as long as 36 or 48 because water takes time to refill."

Protecting emergency reserves

Where a reservoir supplies both everyday water and firefighting, the emergency reserve must be protected from operational use. Requirements depend on the facility's size and whether it uses hydrants, sprinklers, or other firefighting systems.

Warrener explains that the system can physically separate the two uses. If a fire engineer requires 75 000 litres to remain available, the tank can be designed to provide slightly more, while the everyday outlet is positioned so normal consumption cannot compromise the protected reserve.

Alternative sources and risk

Boreholes, municipal supply, and rainwater harvesting can reduce storage required, but each source has its own reliability risks. Warrener suggests using around 60–70% of a borehole's maximum output as a long-term benchmark, rather than designing around its maximum yield. Rainwater harvesting can provide an important additional source, particularly for agriculture.

Ultimately, reservoir sizing comes down to understanding risk. "What risks are you, as the buyer, willing to take?" An organisation with a reliable borehole and municipal supply may require less storage than one dependent on an unreliable municipal network. Conversely, a hospital, mine or factory that cannot afford prolonged downtime may need significantly greater resilience.

The central lesson is that water-security storage cannot be reduced to a single litres-per-day formula. Historical consumption, peak demand, operational priorities, supply interruptions, alternative sources, and risk tolerance all need to be considered. ●



With fire water storage, it is better to be over prepared than under



STORAGE IS THE MISSING LINK IN SOUTH AFRICA'S WATER RESILIENCE

South Africa's water challenges are often discussed in terms of deteriorating infrastructure, ageing pipelines, load shedding and increasing demand. However, according to SBS Tanks Brand Ambassador and business developer Chris Evans, one critical component of the country's water security strategy receives far less attention than it deserves: water storage.

Evans argues that strategic water storage can play a vital role in improving service delivery, supporting infrastructure maintenance and increasing resilience across municipal water networks.

"Water is not in constant flow from the river to the tap," Evans explains. "Abstracting, treating and delivering water all rely on storage."

He notes that South Africa's ongoing water scarcity, coupled with climate variability and the increasing frequency of extreme weather events, has elevated the importance of storage as an essential component of water security. Previous water crises have frequently been exacerbated by insufficient storage capacity, leaving reservoirs unable to buffer interruptions in supply or meet periods of exceptionally high demand.

Evans believes that improving water resilience begins with improving storage resilience. SBS Tanks, a South African manufacturer established in 1998, produces modular steel water storage tanks ranging from 7 000 litres to five megalitres. Manufactured locally in Pinetown, KwaZulu-Natal, the company supplies water storage solutions throughout South Africa as well as internationally.

Rather than positioning itself simply as a tank supplier, Evans says the company aims to become a long-term infrastructure partner to municipalities and water boards. "We are here wanting to assist water boards and municipalities to make their lives easier by providing our solution so that maintenance and infrastructure can be assisted," he says. "We want to be part of the solution."

A helping hand during infrastructure maintenance

He explains that water storage provides municipalities with valuable flexibility when infrastructure failures occur or planned maintenance is required. South Africa's municipalities continue to face ageing infrastructure, increasing demand, power interruptions, and



SBS Tanks Brand Ambassador and Business Developer Chris Evans

significant water losses. During these events, strategically positioned storage tanks can continue supplying communities while repairs are undertaken upstream.

He suggests that additional satellite storage located above or below existing reservoirs could allow maintenance to proceed without immediately disrupting water supply to consumers.

"Maintenance can take place without communities remaining completely without water," he explains. "Perhaps they would have water for an extended period before that tank runs dry."

The approach could reduce service interruptions while improving operational flexibility for municipal maintenance teams. He stresses that maintaining existing storage infrastructure is just as important as installing new capacity. The result, he says, should be a decentralised storage network that strengthens the entire distribution system and improves resilience during emergencies.

Central to how water storage fits into wider water security, the concept of distributed water resilience. Rather than relying solely on a limited number of large reservoirs, he advocates for a decentralised network of strategically positioned storage tanks of varying capacities.

"What we're saying is rather than relying on one large reservoir completely, imagine a network of strategically placed SBS reservoirs from five megalitres down to one megalitre."

These smaller reservoirs could serve several purposes, including regional balancing, community backup storage, hospital emergency supplies, industrial storage and dedicated firefighting reserves. According to Evans, decentralised storage strengthens the overall distribution system by ensuring water remains available closer to end users when upstream infrastructure experiences failures.

The concept is particularly relevant for rural communities, where infrastructure failures often leave elevated storage tanks empty for prolonged periods.

Evans recounted travelling through Limpopo to inspect existing installations. "I saw 20 tanks on that trip. Fifty percent of them weren't working," he says. "That particular supplier did not go back and mend or fix them, therefore leaving that community without water."

Beyond engineering considerations, Evans believes strategic storage can improve public confidence in municipal water services. Through this decentrlaised network Evans envisions residents receiving notification of planned maintenance yet continuing to have water available throughout much of the shutdown period.

Such resilience would demonstrate proactive planning while reducing the impact of unavoidable infrastructure maintenance.

The economic case for steel storage

There are some real advantages of using steel as opposed to concrete tanks too. While concrete generally remains the more economical option for smaller installations between approximately 100 kilolitres and two megalitres, he argues that steel becomes increasingly cost-effective at larger capacities.

"When you're looking at building a five-megalitre concrete reservoir, it would be a good idea to investigate purchasing a five-megalitre steel reservoir," he says.

According to Evans, steel reservoirs offer reduced civil engineering requirements, shorter installation periods and competitive costs for larger storage volumes. An SBS five-megalitre reservoir requires only a reinforced concrete ring beam and sand foundation supporting the internal liner, significantly reducing construction complexity.

The company's largest tanks can be installed within approximately two weeks while offering an expected lifespan of around 65 years.

Evans emphasises that SBS Tanks aims to offer more than manufactured products. The company provides engineering support, design assistance, project management and long-term maintenance services to municipalities, water boards and private industry.

Its portfolio includes projects for municipalities, water boards, mining operations, hospitals, industry and educational institutions across South Africa, while the company also maintains operations elsewhere in Africa and the United States.

Corporate social investment also forms part of its broader approach, particularly through rural water supply projects that improve access to safe water in underserved communities.

For Evans, water storage should no longer be viewed as supporting infrastructure but as essential infrastructure. By combining strategic planning with decentralised storage, municipalities and water boards can improve resilience, maintain services during planned and unplanned interruptions, and strengthen public confidence in South Africa's water networks.

Ultimately, he believes that every litre stored before an emergency becomes a litre available when communities need it most. ●



The SBS team at a successful installation

Connecting South Africa's 'little pieces of infrastructure' earns global honours

Calcamite's use of remote monitoring to manage its decentralised wastewater treatment plants has earned the company and its technology partner, 4Sight, an AVEVA Sustainability Impact Award. **By Kirsten Kelly**

For more than four decades, Calcamite has supplied decentralised wastewater treatment systems to industries and communities across Africa. Throughout this time, one reality has remained consistent: clients expect these systems to operate effectively but generally have little interest in maintaining them.

Who wants to own a sewerage plant?

"Wastewater treatment is rarely a core focus for our clients. Many lack the necessary expertise and do not want to operate or maintain the plants themselves, they would (understandably) rather focus on their core businesses such as running a lodge or managing a shopping centre. They are not interested in pump performance or whether the blowers are working," explains Sebasti Badenhorst, COO of Calcamite.

Despite this lack of interest, regular maintenance is critical. A poorly maintained plant can fail to treat wastewater effectively, causing spills, offensive odours or environmental contamination. It may also expose the client to regulatory action, reputational damage and costly disruptions to operations.



Sebasti Badenhorst, COO of Calcamite

Badenhorst emphasises that packaged sewerage treatment plants are not a product, they are little pieces of infrastructure and, like any other infrastructure asset, they require regular maintenance, regardless of how robustly they are designed. "Our clients would prefer not to take on this responsibility. However, they need the assurance that the plant is operating correctly and that somebody will identify a problem before it causes a spill or affects treatment performance. So in addition to designing and manufacturing the wastewater treatment systems, Calcamite also provides (in most cases) maintenance support."

The need for properly maintained onsite wastewater systems has become even more important following the publication of the revised Compulsory National Water and Sanitation Services Norms and Standards by the Department of Water and Sanitation (DWS) last year.

The standards prohibit water services authorities/municipalities from approving new bulk connections to wastewater treatment works that lack the capacity to accommodate the additional load.

Therefore, where sufficient municipal capacity is unavailable, developers turn to onsite sanitation solutions, such as septic tanks, conservancy tanks or packaged wastewater treatment plants. "Once wastewater volumes exceed a certain threshold, decentralised treatment often becomes more economical than relying on septic or conservancy tanks. Under the revised norms and standards, these systems must be supported by a formal maintenance plan," says Badenhorst.

More than 2 000 of Calcamite's plants have been installed across South Africa and elsewhere on the continent, collectively treating approximately 2.3 million m^3 of wastewater a year.

These plants are often dispersed throughout remote locations where specialist operational skills are scarce and travelling to site is costly. This makes it difficult to ensure that hundreds of relatively small plants continue to perform effectively without skilled personnel stationed at every site.

"You cannot manage what you cannot see. We needed a way to monitor our plants continuously, rather than relying

Many of Calcamite's plants are often dispersed throughout remote locations where specialist operational skills are scarce and travelling to site is costly







▲ The plant has a design capacity of 15 m³/day and treats wastewater for reuse in irrigation

◀ The Gourikwa Nature Reserve project received the AVEVA Sustainability Impact Award

solely on periodic site inspections or waiting for clients to report a problem. A site inspection is visiting a plant, it is not monitoring a plant. Calcamite therefore issued a request for quotation (RFQ) to identify a partner capable of delivering an effective remote-monitoring solution," explains Badenhorst.

4Sight and the brief

4Sight was selected as this partner because they were the only company to propose a cloud-based solution requiring minimal onsite infrastructure and a simple user interface.

"The solution had to be appropriate for small plants. It could not be over-engineered because every additional feature is an added cost. Like Calcamite plants, the remote monitoring solution had to be scalable and robust. 4Sight recommended AVEVA Connect, a proven platform that could be customised to meet Calcamite's specific needs, instead of building a bespoke system from scratch. AVEVA Connect is a proven solution backed by a global company which has the resources to continually invest in the platform and expand its capabilities. 4Sight is an endorsed AVEVA partner and systems integrator," states Badenhorst.

In a mere five weeks, 4Sight had to implement the remote monitoring solution at the Calcamite wastewater treatment plant at the Gourikwa Nature Reserve, approximately 1 380 km from Calamite's Gauteng factory

A key requirement of the project was to minimise the amount of instrumentation required, making the solution as cost-effective as possible. Calcamite chose to only monitor parameters that were critical to the proper functioning of their plants and did not install a user interface onsite. The system had to have the ability to connect via wireless, the ethernet or cell phone networks.

The pilot project

In a mere five weeks, 4Sight had to implement the remote monitoring solution at the Calcamite wastewater treatment plant at the Gourikwa Nature Reserve, approximately 1 380 km from Calamite's Gauteng factory. The plant has



a design capacity of 15 m^3/day and treats wastewater for reuse in irrigation.

4Sight installed the AVEVA Connect platform and modified it to monitor parameters such as incoming and outgoing flow, peak flow, pressure, electrical and mechanical equipment uptime, electrical current and energy consumption. It alerts Calcamite when equipment stops operating, begins taking strain or moves outside its design parameters. "Just as a car must be serviced after travelling 10 000 km or 15 000 km, certain equipment requires servicing after a specified number of operating hours," maintains Badenhorst.

The project reduced monthly oversight and maintenance costs by 85%. It also eliminated more than 22 600 km of travel, avoiding about 27 tonnes of carbon dioxide emissions. Without the Calcamite plant, sewage would have to be transported over 120 km to the nearest treatment plant. It was further calculated that the plant recovered 2 123 m^3 of water for local groundwater recharge, along with 63 kg of nitrogen and 6.3 kg of phosphates. There was also lower energy consumption due to the use of small pumps and blowers.

"We have not had a day of trouble on that Gourikwa site," states Badenhorst.

Other benefits

The remote monitoring solution has since been rolled out across other Calcamite plants, providing a consolidated view of all connected systems. Alerts can be issued when equipment or processes move outside the plant's design capacity or specified operating conditions, allowing Calcamite to investigate problems before they develop into plant failures.

Historical trends can also be used to plan preventative maintenance. At one site, Calcamite connected an existing transfer pump, which moved sewage from a pump station to the treatment plant, to its electrical panel and AVEVA Connect dashboard. "When the pump failed, we could see it immediately on the dashboard and alerted the client. Without remote monitoring, they may only have discovered the failure once sewage backed up or spilled from the pump station," explains Badenhorst. This illustrates how continuous remote monitoring can reduce the operational and environmental risks associated with decentralised wastewater treatment by identifying problems early enough for corrective action to be taken.

From a Calcamite perspective, AVEVA Connect tracks equipment runtime and performance across multiple plants from a central dashboard. This helps Calcamite identify equipment in the same area that needs attention and combine maintenance visits. Remote diagnostics also help technicians arrive with the correct tools and spares, reducing unnecessary inspections and repeat journeys.

"A surprising advantage for me was the use of artificial intelligence (AI) on AVEVA Connect platform. Calcamite can use AI to summarise plant performance over a specified period of time and identify whether action is required. This reduces the time employees must spend manually reviewing multiple dashboards and will become increasingly important as more plants are connected," adds Badenhorst.

Importantly, Calcamite can use insights generated through the data from AVEVA Connect to refine its plant designs. Performance data reveals how water consumption differs across lodges, restaurants and residential developments. "The information coming back from our installations is one of the greatest advantages for us," Badenhorst says. "It allows us to test

WHY ARE DECENTRALISED WASTEWATER PLANTS SUSTAINABLE?

By treating wastewater close to where it is generated avoids the cost and environmental impact of constructing extensive sewer networks or transporting sewage by tanker. They also make treated effluent readily available locally for irrigation, dust suppression and toilet flushing, reducing demand for potable water. Nutrients contained in the treated water can support landscaping and agricultural applications.



More than 2 000 of Calcamite's plants have been installed across South Africa and elsewhere on the continent, collectively treating approximately 2.3 million m^3 of wastewater a year



A key requirement of the project was to minimise the amount of instrumentation required, making the solution as cost-effective as possible

our assumptions against real-world conditions and size each new system more accurately for its intended use. The data can also help us to better justify any suggested plant modifications to our clients."

The Award

The Gourikwa Nature Reserve project received the AVEVA Sustainability Impact Award. Presented at the AVEVA World 2026 event in Milan, Italy, the international award recognises projects that deliver measurable progress in decarbonisation, circularity and resilience. Calcamite and 4Sight were selected from three global finalists following a vote by delegates attending the event.

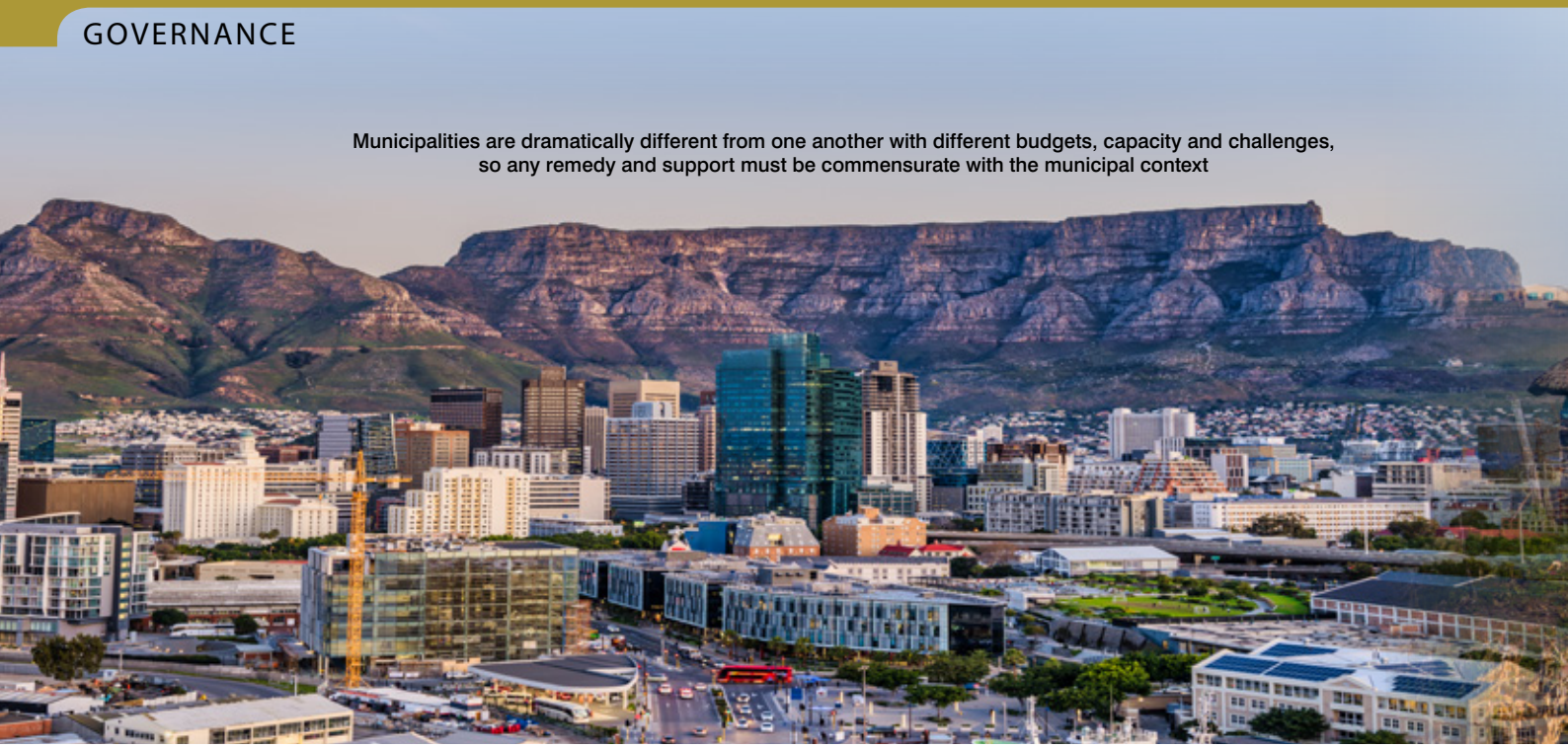
For Badenhorst, the award demonstrates that 'little pieces of infrastructure' can collectively make a substantial contribution to sustainability. "In South Africa, we install solar panels, harvest rainwater and invest in decentralised wastewater treatment systems out of necessity. Yet we often overlook the fact that these practical responses to everyday challenges are also inherently sustainable. We forget the collective positive impact that these investments make on our planet because we are focussed on survival.

"In South Africa, we install solar panels, harvest rainwater and invest in decentralised wastewater treatment systems out of necessity. Yet we often overlook the fact that these practical responses to everyday challenges are also inherently sustainable. We forget the collective positive impact that these investments make on our planet because we are focussed on survival. When we presented this approach in Europe, people were astounded that South Africans generate their own electricity, harvest water and even treat their own sewage. It was great to get recognition for that on the world stage and a fantastic experience to attend AVEVA World 2026."

When we presented this approach in Europe, people were astounded that South Africans generate their own electricity, harvest water and even treat their own sewage. It was great to get recognition for that on the world stage and a fantastic experience to attend AVEVA World 2026."

The award also highlights how digital technology can address one of the principal weaknesses historically associated with small package plants: inadequate operation and maintenance. "This tool helps us provide an enhanced level of service to our clients. Our tiny pieces of infrastructure perform reliably when operated within their design parameters and maintained regularly, and AVEVA Connect strengthens our ability to support them. With greater visibility and control over plant performance, we can also confidently offer our clients a broader range of treatment technologies," adds Badenhorst.

In conclusion, she states that the technology to treat sewage is not new. What is needed is to take this technology, scale it down for smaller plants and make it robust. "Decentralised wastewater treatment plants must be recognised and managed as infrastructure. Remote monitoring gives us the visibility needed to do exactly that." ●



Municipalities are dramatically different from one another with different budgets, capacity and challenges, so any remedy and support must be commensurate with the municipal context

WATER SERVICES AMENDMENT BILL MOVES SECTION 78 INTO THE SPOTLIGHT

The proposed licensing system for water service providers could fundamentally change how municipalities deliver water and sanitation. While the reforms aim to improve accountability and performance, they may also force struggling municipalities to reconsider their service-delivery models through the complex Section 78 process. **By Kirsten Kelly**

Under the Water Services Act (No. 108 of 1997), a water services authority (WSA) is the municipality legally responsible for ensuring access to water and sanitation services within its area. The water services provider (WSP) is the entity that delivers the service, including operating and maintaining infrastructure, engaging with consumers and collecting revenue. The WSP may be an internal municipal department or external to the municipality, such as another municipal entity, an organ of state like a water board, a community-based organisation or other non-governmental organisation, or a private entity.

An external mechanism requires a service delivery agreement. A municipally owned entity is therefore an external mechanism, even though the municipality owns it.

Separation of functions

Most municipalities currently perform both roles, having opted to provide water and sanitation services themselves. Although the Water Services Act requires them to manage and account for their WSA and WSP functions separately, few do so. Separating the WSA and WSP functions is important because it clarifies accountability, provides important information about water revenue and allows service delivery performance to be properly monitored.



Alana Potter, specialist: sanitation and hygiene at the South African Local Government Association (Salga)

Last year's Water and Sanitation Indaba called for all WSAs to legally separate their WSA and WSP functions and to account for their water revenue and expenditure in completely ring-fenced financial records. The ultimate goal is to move towards a utility model at the WSP level, where the WSP has full control over recruitment, supply chain management, billing and revenue collection to ensure financial sustainability. This has been strongly advocated for in the Metro Trading Services Reform System, it is included in the National Water Action Plan and its implicit in the reasoning behind the Water Services Amendment Bill (currently undergoing public consultation).



WSP licensing

The Water Services Amendment Bill proposes compulsory licensing for water services providers operating as municipal service delivery mechanisms. A licensing authority would set minimum competency and application criteria with reference to technical, financial and governance requirements.

If a WSP's licence is proposed for revocation, the Bill would require the WSA to make interim arrangements to maintain services and follow the applicable Municipal Systems Act process to decide on a service delivery mechanism. The WSA remains responsible for choosing and approving that mechanism. The Minister cannot appoint a WSP but the Bill provides that the Minister can require the WSA to choose a licensed WSP. The decision and appointment of the WSP must remain with the WSA as this executive function lies within the municipality.

Alana Potter, specialist: sanitation and hygiene at the South African Local Government Association (Salga), reinforces this point: "If a WSA decides to appoint an external WSP, it must follow the processes set out in sections 76 to 78 of the Municipal Systems Act (No. 32 of 2000). Regardless of who is appointed as the provider, the municipality remains accountable for ensuring that services are delivered."



She adds that the criteria and process of the licensing of WSPs published within a year of the approval of the Bill must go through a process of public consultation. "It is difficult to engage the contours of WSP licensing and its implications without knowing the framework and criteria. But from a Salga perspective, it is essential that the criteria for WSP licensing align with the Municipal Systems Act criteria as that is what municipalities have to account to for all municipal services and service delivery mechanisms."

According to Dr Sean Philips, the director-general of the DWS: "The licensing requirements will be kept to a minimum and will be as simple as possible. It will largely be based on the Green Drop, Blue Drop and No Drop Reports as well as information supplied to National Treasury and the Department of

"Proposed section 82A of the Water Services Amendment Bill would allow a director of a business entity, or a municipal manager, to be convicted personally for an offence committed by that entity or municipality if they knew of the offence and it resulted from their failure to take all reasonable steps necessary to prevent it"

Cooperative Governance and Traditional Affairs (Cogta). We will keep the reporting burden on municipalities to a minimum. We do not want this licensing system to result in an arduous additional bureaucratic load on municipalities. Existing WSPs will be given an interim license so they can continue to operate legally while they apply for a license. The performance license does not replace the



WSA's role of appointing and monitoring the performance of the WSP. This is all about strengthening the role of WSAs within municipalities and to improve the performance of WSPs."

The Minister cannot request a WSA to appoint an alternative licensed WSP if there are no licensed WSPs available. Therefore, when the regulations for the operating license come into effect, DWS will advertise for any interested party to apply for a WSP operating license, including existing WSPs in municipalities, private companies, water boards, non-governmental organisations and community-based organisations.

"The preference is for WSAs to consider appointing external WSPs out of their own will. DWS is planning to facilitate and support the Section 78 process by collating as much information as possible on external delivery models including concessions, water boards and municipal entities, to help WSAs make informed decisions," states Dr Philips.

"An obvious question revolves around what would happen to service delivery when DWS withdraws a license from a WSP? This needs to be clarified through engagement on the licensing framework when that is published," says Potter.

Section 78 explained

Section 78 is sometimes presented as a route to outsourcing struggling municipal services. In reality, it is a structured decision-making process that requires a municipality to assess whether a service should be delivered through an internal or external mechanism. This applies to municipal services ranging from water and sanitation to electricity and waste management. The decision on the most appropriate delivery mechanism ultimately rests with the municipal council.

"Regulation must improve delivery. Salga supports stronger efforts to improve water and sanitation services but argues that regulatory remedies must reflect the variety of different circumstances in which municipalities operate. Municipalities are dramatically different from one another. They have different budgets, capacity and challenges, so the remedies and support must be commensurate with the municipal context."

"An important feature of Section 78 is that it does not place internal and external provision on an equal starting line. It favours internal provision. A municipality must first assess whether it can provide the service internally before considering an external mechanism," explains Potter.

"It is not something that can be taken lightly. The internal assessment considers factors such as the direct and indirect costs and benefits of the service, the municipality's current and future capacity, and the likely effect on municipal employees," she adds.

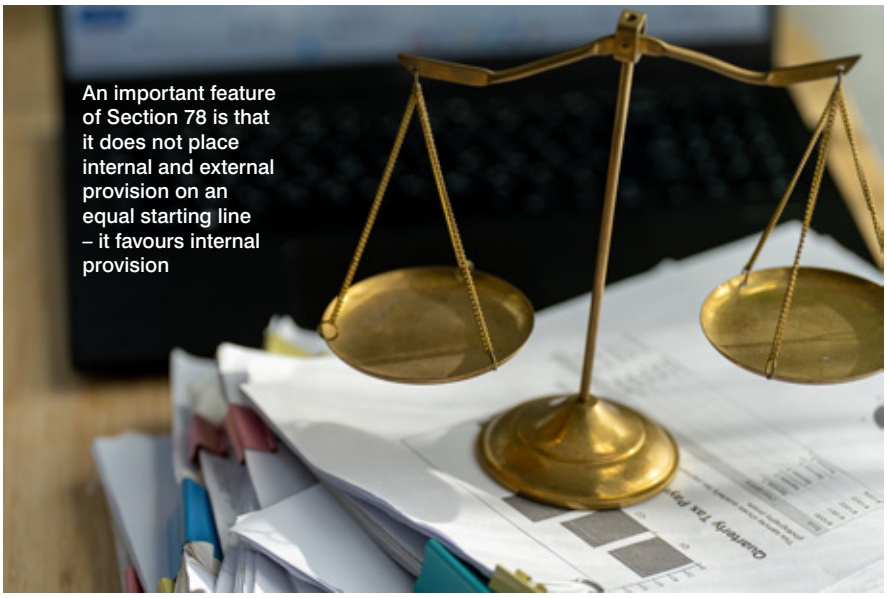
Once the assessment is completed, and the municipality decides to move ahead with external provision, they must notify the local community. Section 78 is explicitly consultative, involving engagement with organised labour, communities and oversight bodies.

The municipality may then assess external WSP mechanisms. The criteria in the Systems Act include costs and benefits, the prospective provider's capacity, environmental and public health implications, community and labour views, and the potential effects on development and job creation. This is followed by a detailed feasibility study.

The municipality must define the service and expected outputs, its expected duration, test value for money and affordability, consider how poorer households will be served, determine how technical, operational and financial risks will be allocated, and assess the implications for employees, assets, liabilities and municipal plans.

"In addition to Section 78, if a WSA wants to enter into public-private partnerships (PPP), they also have to





An important feature of Section 78 is that it does not place internal and external provision on an equal starting line – it favours internal provision

meet requirements set out in Section 120 of the Municipal Finance Management Act (MFMA) No 50 of 2003," says Potter.

Challenges linked to Section 78 and the Water Services Amendment Bill

A Section 78 assessment requires technical, financial, legal, human resources and institutional expertise, which smaller and rural municipalities may struggle to access.

Potter points to the support model established during the restructuring of local government in the late 1990s and early 2000s. Cogta (then known as dplg), DWS (then known as DWAF), National Treasury, and Salga worked together through a joint response structure that coordinated multidisciplinary expertise to municipalities to conduct their first Section 78 assessments. That support framework later fell away. "With licensing and wider water-sector reforms now likely to increase demand for assessments, discussions have started about rebuilding a coordinated national support mechanism. This will require institutional commitment and funding. In the interim, a Section 78 masterclass developed through a Water Research Commission project is expected to be rolled out in the provinces."

Potter describes this as an important starting point, but not a replacement for the intensive support some municipalities will require.

Without adequate assistance, there is a risk that a complex assessment intended to improve decision-making becomes a procedural compliance exercise.

For Section 78 to work as intended, municipalities must be able to gather reliable evidence, evaluate realistic options and defend the final council decision.

"Regulation must improve delivery. Salga supports stronger efforts to improve water and sanitation services but argues that regulatory remedies must reflect the variety of different circumstances in which municipalities operate. Municipalities are dramatically different from one another. They have different budgets, capacity and challenges, so the remedies and support must be commensurate with the municipal context," explains Potter.

The Water Services Amendment Bill has also introduced strengthened compliance and enforcement mechanisms. The Bill would make failure to comply with an obligation, instruction or directive under the Water Services Act, after being directed to do so, an offence. Upon conviction, the maximum penalty would be a R10 million fine, 10 years' imprisonment, or both. Proposed section 82A would allow a director of a business entity, or a municipal manager, to be convicted personally for an offence committed by that entity or municipality if they knew of the offence and it resulted from their failure to take all reasonable steps necessary to prevent it.

"Salga is concerned about the movement towards laying charges against municipal managers in their personal capacity. Municipal water infrastructure challenges frequently arise from historical infrastructure backlogs, funding constraints, skills shortages and ageing infrastructure inherited over decades. These challenges are often a result of decisions made years ago and are beyond the direct control of the current municipal managers, who are unlikely to even hold office once criminal charges have been placed. This would also make it difficult to attract and retain professionals, who would fear being prosecuted for a situation they themselves did not personally create," maintains Potter.

Myths debunked

The relationship between the Water Services Amendment Bill and Section 78 has given rise to several misconceptions, including that DWS could appoint external WSPs.

A licensing decision cannot displace the municipal council's legal role in selecting a service-delivery mechanism. However, licensing could become a trigger for a Section 78 assessment. If the licensing authority finds that an existing provider does not meet the required technical, financial or governance standards, the municipality may have to reconsider how the service is delivered. Even where national or provincial intervention is justified, its scope and duration must be limited to what is necessary to remedy the identified failure. Any assumption of municipal functions should be temporary and directed towards restoring the municipality's capacity to fulfil its obligations effectively and sustainably.

Potter also explains that Section 78 is not DWS legislation. "It is local government legislation developed by COGTA for all municipalities to assess their service delivery mechanisms."

Ultimately, if the poor performance of a WSP triggers a Section 78 process, appointing an external provider will be neither quick nor automatic. Sections 76-78 guide governance decisions, not procurement processes and the Systems Act requires consultative and evidence-based assessment that will take time and require multidisciplinary effort and support. The value of Section 78 is that it will enable municipalities to consider their institutional arrangements to improve water and sanitation service delivery in an evidence-based and holistic manner. ●



THE ROLE OF CITIZEN SCIENCE IN THE WATER SECTOR AND DEMOCRACY

South Africa's constitution guarantees water as a human right. A bold and admirable declaration, but one that exists as an ideal, rather than a reality. Across the country, access to drinking water is limited in quantity and quality, falling short of the constitutional right. **By Duncan Nortier**

Part of a functional democracy is the ability to hold those in power to account for their failings, missteps, and promises. WaterCAN is an organisation that empowers communities through citizen science, tools, and training to monitor water, drive accountability, catalyse public action, and foster collaboration, and Dr Ferrial Adam, executive director of WaterCAN, believes that citizen science exercises this democratic obligation.

Dr Adam says, "Democracy is not just the ability to vote. Being an active citizen means understanding how government affects you and advocating for yourself and others for change." Part of WaterCAN's mission is to give interested members of the public the tools to test and understand their water, make informed decisions and escalate issues to government. In the five years of active testing, WaterCAN has made the case that citizen science should play a larger role in the water sector, especially since it is these very citizens that water issues affect.

How does citizen science work?

Testing water and responding to concerns is a large task, and municipalities focus their testing on larger infrastructure such as reservoirs and towers, but this leaves the rest of South Africa's water infrastructure largely untested. "The power of having active citizens is that they can test in extremely localised conditions. They can identify a single tap, pipe, or part of a river that is contaminated, outside of the larger infrastructure," says Dr Adam.



Dr Ferial Adam, CEO of WaterCAN

WaterCAN aims to empower concerned citizens, helping them become active participants in the politics of water

WaterCAN's model engages with people who show interest, and fosters interest in communities where water testing is needed, such as rural or lower-income areas. "We do not prioritise any area or group over another. We work where there is interest, and we adapt our work to the context," adds Dr Adam. There is a lot of interest in lower-income or rural areas, simply due to them being concerned about their water in ways that middle income are not. WaterCAN works with people who sometimes don't have basic education, where science can be intimidating, but as Dr Adam explains, "Part of getting active citizens is meeting them where they are at. In our training, we simplify the process by explaining that everyone can be a scientist. We demonstrate the method, and we show them that they already possess these skills." This is itself an empowering exercise, and as these citizens become active in their own water testing and reporting, they feel a sense of power in their ability to promote change.

She elaborates, "The training process involves taking a group of concerned



Testing water is the cornerstone methodology of WaterCAN, teaching citizens to understand the water they rely on

citizens and going through the testing kit, map, and reporting procedure. Some people, especially in rural contexts, are scared of doing something wrong, but we explain that if they can send a WhatsApp or watch a TikTok, then they have the skills to report and upload."

The data that is collected in public, but the information of the users is private. This builds a sense of trust between the scientists and the platform where they contribute to a larger goal.

The efficacy of citizen science

While citizen science has the potential to create active participants in South Africa's democracy, there is also a technical case for their work.

WaterCAN with a community in KwaZulu Natal

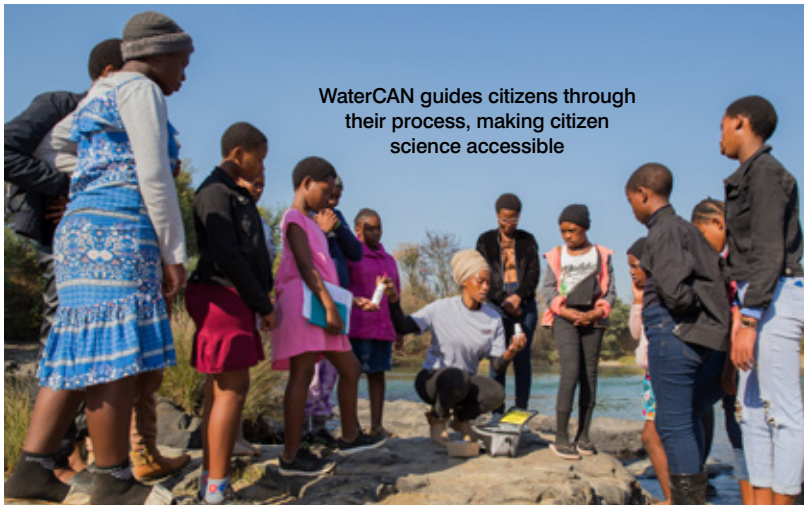
As mentioned earlier in the article, "The ability to test locally and generate local data outside of major infrastructure is invaluable," says Dr Adam. Providing this data and having the tests repeated on a recurring basis allows for deeper insights into patterns and problems that become valuable to municipalities as well as provincial and national government. She adds, "Municipalities are struggling; this isn't a secret, and our model aims to include municipalities so that issues are flagged with them, and they can then go about fixing the issue. This is working alongside them, not against them."

In February 2026, residents of Marakong Village in the Free State alerted activists and citizen scientists, who then worked closely with WaterCAN to collect samples of water from several households. They detected bloodworms in the tap water and immediately alerted authorities. Maluti a Phofung Water, the water entity catering to Marakong, then confirmed the test results, shut down the pipeline and flushed the system, opening the valves only when a lab test could support the decision.

WaterCAN as an organisation is also able to escalate matters if municipalities ignore their alerts. Dr Adam elaborates, "While our intention is to get the municipalities to respond to potential contaminants, they are sometimes unwilling. It is their legislated duty to provide clean drinking water, and if they ignore us, we escalate to the Department of Water and Sanitation. Our citizen scientists provide us with good data, which allows us to amplify their voices." In the event of complete failure to acknowledge the alerts, WaterCAN, by virtue of being backed up by scientific data, can open criminal charges against municipal officials for not delivering on their mandate.

Another key role that citizen science plays is bringing awareness to water issues in South Africa, which is why WaterCAN often works with schools to promote science and water knowledge. "Creating a lasting impression on young people at a school level is vital if we want the future generations to be more active and more informed than we are," says Dr Adam. ●





WaterCAN guides citizens through their process, making citizen science accessible

ADVANCED WATER-QUALITY MONITORING IN THE FIELD

Water is one of our most valuable natural resources, and effective monitoring plays an important role in understanding and protecting it. Actively monitoring water provides an opportunity to recognise the importance of environmental monitoring and the reliable data it generates.

If rivers, dams, lakes, wetlands and other aquatic environments are regularly monitored, the data gathered provides a clearer picture of changing water conditions. This data from reliable measurements supports environmental assessments, water quality management, and promotes informed decision-making.

Turning measurements into meaningful data

Collecting a measurement is only part of the monitoring process. The ability to record, organise, review and share data is equally important.

This is where instruments like the HI98594 Portable Bluetooth® Multiparameter Meter from Hanna Instruments bring added value to field monitoring. Its multisensor probe allows users to measure multiple water-quality parameters in one system, while advanced data logging provides extensive storage for both on-demand and interval measurements.

The HI98594 Portable Bluetooth® Multiparameter Meter is designed for field-based water-quality monitoring, combining multiparameter measurement, data logging and wireless connectivity in a portable instrument. Its probe measures pH/ORP, electrical conductivity (EC), turbidity and dissolved oxygen, using optical dissolved oxygen (OPDO®) measurement technology and a new combined EC/turbidity sensor. Automatic sensor recognition, colour-coded sensors and field-replaceable sensors support setup and maintenance, while the instrument can display up to 12 parameters simultaneously. It features Bluetooth® 5.0 connectivity to the Hanna Lab App and Hanna Cloud, allowing users to review, graph and share measurement data.

The meter can store up to 70,000 measurement records, with selectable logging intervals ranging from one second to three hours, and allows measurements to be organised into named lots with remarks. Recorded data can also be viewed graphically on its backlit display. A Quick-DIN connector provides a waterproof probe connection, and cable options range from 4 m to 50 m. The instrument is powered by a rechargeable lithium-ion battery, providing up to approximately 126 hours of total battery life, and includes four AA alkaline backup batteries, with automatic switching to backup power when required.



Designed for field-based water-quality monitoring, the rugged, portable instrument combines advanced measurement, data logging and connectivity

Reliable environmental information begins with reliable measurement. By combining advanced sensing, extensive data logging and connected data management, the HI98594 provides users with the tools to capture meaningful water-quality information directly in the field. ●



HI98594 Portable Bluetooth® Multiparameter Meter from Hanna Instruments brings added value to field monitoring



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MEMBRANE BASICS FOR WATER TREATMENT

As pressure on conventional water sources increases, membrane filtration is becoming an important step for producing reliable water quality from sources ranging from surface water and seawater to industrial and municipal wastewater.

Water treatment plants are being required to manage more variable raw water, comply with tighter quality standards and produce more water from increasingly constrained resources. At the same time, space, energy use and operating costs remain critical considerations.

These pressures are strengthening the case for membrane filtration. Ultrafiltration can provide a physical barrier to suspended particles and microorganisms, support water reuse and, in the case of nanofiltration and reverse osmosis, remove dissolved substances and salts. When properly selected, operated, and maintained, they can deliver consistent treated-water quality within a relatively small footprint.

Speaking at a recent membrane solutions seminar in South Africa hosted by Roch Distributors, Ali Qundil, regional manager for industrial water at Pentair, emphasised that selecting the right membrane requires evaluating the complete lifecycle offering, not the product alone. "Plant owners, consultants and contractors should evaluate not only the membrane technology, but also the application expertise and support services available across design, execution and operation. Through its Membrane+ Approach, Pentair X-Flow brings these elements together to support reliable long-term plant performance."

Surface water, groundwater, seawater, process water and treated wastewater can differ significantly in suspended solids, salinity, organic matter, temperature, microbiological activity and fouling potential. Together with the required treated-water quality and plant operating conditions, these characteristics influence the membrane process, operating configuration, pretreatment and cleaning strategy.

Pentair X-Flow membrane solutions are used worldwide across potable water, process water, industrial and municipal wastewater, and beverage applications.

How membranes work

A membrane is a thin, semi-permeable barrier that separates substances from water. Depending on its pore size and separation mechanism, it can retain suspended particles, colloids, microorganisms or dissolved substances.

The Pentair X-Flow portfolio focuses primarily on polymeric hollow-fibre ultrafiltration and microfiltration solutions for municipal and industrial water and wastewater treatment. Membranes can be manufactured from polymeric or inorganic materials. Polymeric membranes are widely used in municipal and industrial water treatment because they are available in several materials and configurations, including hollow-fibre, spiral wound, flat sheet and tubular designs. They can offer an effective balance of treatment performance, scalability, energy consumption and lifecycle cost.

Pentair X-Flow uses advanced polymeric membrane technology in its ultrafiltration and nanofiltration portfolio, and its hollow-fibre membrane products use polyethersulfone, or PES. The membrane material and asymmetric pore structure are designed to provide a balance of permeability, mechanical properties and chemical resistance within the operating limits specified for each product.

This combination of proven polymeric membrane technology, application-specific configurations and operational flexibility makes Pentair X-Flow suitable for a broad range of potable water, process water, industrial wastewater, municipal wastewater and beverage applications.

Protecting membrane integrity

Once the appropriate membrane process has been selected, maintaining membrane integrity becomes critical to preserving treatment performance. Maintaining membrane-fibre integrity is critical to preserving the intended physical barrier and reliable filtration performance.

"Pentair X-Flow's polymeric hollow-fibre membranes combine single-bore fibre design with inside-out filtration. This configuration supports controlled filtration, effective hydraulic cleaning and integrity monitoring, helping operators maintain reliable membrane performance," explains Anjali Ramachandran, technical support engineer at Pentair X-Flow.

In an inside-out configuration, feedwater flows through the fibre lumen and permeate passes through the membrane wall to the outside of the fibre. The controlled internal flow path supports



From left: Ali Qundil, regional manager for industrial water, Pentair and Anjali Ramachandran, technical support engineer, Pentair X-Flow

The membrane spectrum

Process	Indicative pore size (µm)	Typical separation function	Indicative operating pressure (bar)	Typical use
Microfiltration	0.1 – 1 µm	Suspended solids, bacteria, protozoa	0.1 – 2 bar	Pretreatment, clarification
Ultrafiltration	0.01 – 0.1 µm	Colloids, suspended solids, bacteria and certain viruses and macromolecules, depending on membrane characteristics and integrity	Product- and application-dependent	Drinking water, reverse osmosis pretreatment, membrane bioreactor
Nanofiltration	0.001 – 0.01 µm	Multivalent ions, hardness, and selected organic compounds	5 – 20 bar	Softening, colour and micropollutant removal
Reverse Osmosis	No defined pore size	Dissolved salts and low-molecular-weight solutes	10 – 80 bar	Desalination, high-purity water and reuse



Pentair Flow Xiga

hydraulic cleaning and helps contain the feedwater and retained solids within the fibre lumen.

Cleaning requirements depend on the membrane configuration, module design and feedwater characteristics. Inside-out systems can use hydraulic backwashing, forward flushing, air-assisted flushing and chemical cleaning in different combinations. The cleaning sequence should be selected according to the solids load, fouling behaviour and product operating guidelines.

Managing fouling

Fouling remains one of the principal operating challenges in any membrane system. It may be caused by suspended particles, organic matter, mineral precipitation or biological growth.

Appropriate pretreatment is therefore central to successful membrane operation. It can reduce the fouling load reaching the membrane, help maintain permeability and support effective and sustainable cleaning.

Hydraulically reversible fouling can often be controlled through backwashing and flushing. Depending on the solids load and membrane configuration, air-assisted flushing or internal recirculation may also be applied. Fouling that is not sufficiently removed hydraulically may require chemically enhanced backwashing or periodic cleaning in place, using procedures compatible with the membrane.

Chemical-cleaning conditions, including chlorine concentration, pH, temperature and exposure time, must remain within the limits specified for the selected membrane product. Continuous chemical dosing should not be inferred from membrane cleaning tolerance and should only be applied where supported by the process design and product guidelines.

Selecting the right configuration for the application

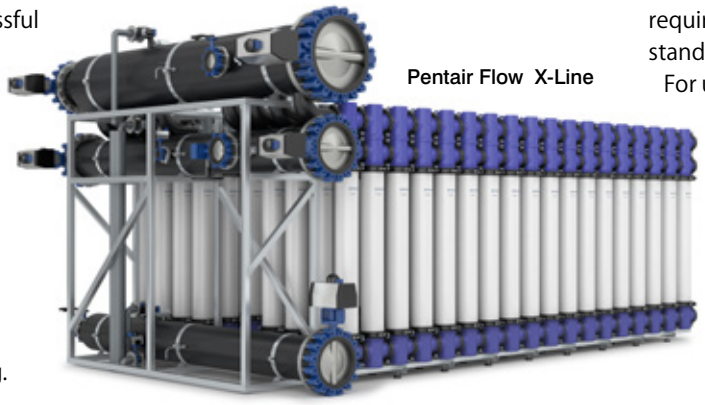
The appropriate ultrafiltration configuration depends on the application, feedwater characteristics, operating conditions, and project requirements.

The seminar covered three principal Pentair X-Flow ultrafiltration system configurations.

- Aquaflex is a vertical, skid-mounted ultrafiltration solution designed for challenging water and wastewater applications with highly variable feedwater conditions. Depending on the membrane and system design, cleaning strategies can include air-assisted flushing and internal circulation to support effective solids management and reliable operation.
- X-line is a flexible, pre-engineered ultrafiltration solution designed for projects where efficient system design, installation, and integration are important considerations. Its standardized racks and manifolds, together with its streamlined design, simplify system design, installation, and integration, supporting quick and efficient project execution.
- Xiga is a horizontally installed ultrafiltration solution designed for compact, large-capacity installations, including applications requiring higher operating pressures. Depending on the selected membrane element and system design, it can be integrated into different hydraulic arrangements to meet project-specific capacity, hydraulic, footprint, and installation requirements.

The three solutions are based on Pentair X-Flow hollow-fibre membrane technology but differ in their configuration, membrane-system connections, operating philosophy, system layout, hydraulic design, operating conditions, and solids-management capability. This allows each solution to be matched to the feedwater, treatment objective, and site requirements rather than applying a standard arrangement to every project.

For utilities and industries seeking new sources of water, this whole-system approach is critical. Ultimately, successful membrane filtration starts with understanding the application, then selecting the technology, configuration, and support approach best suited to its requirements. ●



Pentair Flow X-Line

PORTABLE SANITATION NEEDS A CRADLE-TO-GRAVE APPROACH

Delivering a toilet is only the visible part of a sanitation service. Robert Erasmus, managing director of Sanitech, says the real test is whether waste is safely contained, collected, transported and treated, while workers and the environment are protected at every step.

"If you generated the waste, you are ultimately responsible for its safe disposal," states Erasmus. Yet many clients still underestimate this obligation. "A lot of people think, 'I'm going to get someone to take the stuff away, and then it's not my problem.' Unfortunately, that is not how it works."

The National Environmental Management: Waste Act places a duty on waste generators to take reasonable measures to prevent harm and ensure environmentally sound disposal. The National Water Act also requires those who own, occupy or control land to prevent activities on that land from polluting water resources.

This does not absolve the contractor of responsibility. The contractor remains accountable for collecting, transporting and disposing of the waste lawfully, but waste generators are ultimately responsible. If the contractor fails to perform or disposes of the waste illegally, the client could face regulatory action or clean-up costs.

The principle applies to waste from portable toilets and septic tanks alike. Choosing a contractor therefore cannot be reduced to price alone. Clients also need evidence that a contractor's transport permissions are valid, disposal takes place at an authorised facility and the people handling the waste are properly trained and protected.

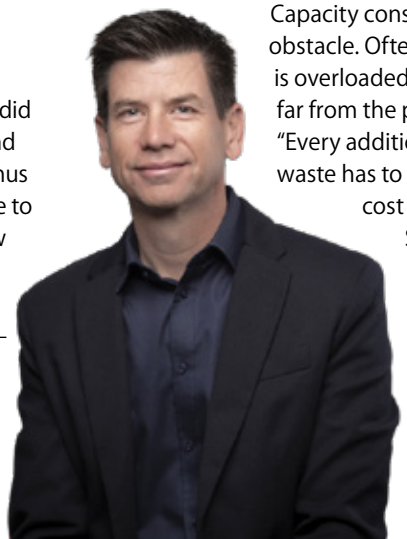
Compliance that can be proved

Portable sanitation sits across several parts of the regulatory landscape. Environmental law, different occupational health and safety requirements, building rules and municipal bylaws can all apply, depending on the service and site. Erasmus says this fragmented framework makes disciplined management systems particularly important.



For Sanitech, ISO 14001 environmental management and ISO 45001 occupational health and safety are the most directly relevant certifications for portable sanitation. The environmental system requires the company to maintain waste-management plans, check transport and discharge permissions, keep training records and prepare for spills. The occupational health and safety system covers safe working procedures, standard operating procedure, personal protective equipment, exposure controls and employee health records and vaccinations issued.

The value lies in the continuing audit trail. "It is not a once-off tick-box exercise where you say, 'I did an environmental plan and it is in a cupboard,'" Erasmus says. "You constantly have to keep it updated and show the evidence. It has taken Sanitech close to a decade to reach this high level of compliance."



Robert Easmus, MD, Sanitech

Sanitation as a service

Equipment and servicing methods are part of that risk control. Sanitech moved away from removable drum-type systems as its standard operating model in favour of concealed waste tanks emptied by vacuum pumps. This limits direct contact with waste and reduces the risk of spills during servicing. The company also stopped using formaldehyde-based chemicals around a decade ago, opting for bioenzyme additives to control odour with less risk to operators and the receiving environment.

Greener chemistry brings its own operational demands. Bleach and other household chemicals can neutralise biological additives, particularly where a communal toilet is also used as a convenient disposal point for wash water. That makes user education part of the service. The chemical, the toilet, the collection method and the behaviour of users all have to work as a system.

The treatment challenge

Portable toilets can save substantial volumes of potable water because they do not flush after every use. The trade-off is a highly concentrated waste stream that must be collected and treated. Erasmus says this concentration is one reason municipal wastewater works can be reluctant to accept portable toilet waste. Many plants were designed for sewage diluted by water from toilets, basins and showers, while their access and discharge points may not be designed for frequent tanker movements.

Capacity constraints add another obstacle. Often a municipal works is overloaded, out of service or far from the point of collection. "Every additional kilometre that waste has to trave raises fuel use, cost and risk. Fortunately Sanitech has a wide branch network that shortens collection routes, but the most solution is (where possible) to





1 Sanitech established treatment plants at Steelpoort, Secunda and Witbank after long transport distances and rising municipal discharge tariffs made disposal increasingly costly

2 Waste must be safely contained, collected, transported and treated

3 The Khusela unit is a patented sanitation solution to replace dangerous and unhygienic traditional open pit latrines

treat waste closer to where it is generated," explains Erasmus.

This operational pressure helped shape Sanitech's water and waste treatment division. The company established treatment plants at Steelpoort, Secunda and Witbank after long transport distances and rising municipal discharge tariffs made disposal increasingly costly. It also began offering package plants at customer sites, particularly for remote industrial and mining operations.

Sanitech's acquisition of Green-Tech Water and Waste Technology followed close to a decade of collaboration with the specialist as a design and technical partner. The deal added in-house design, specification, procurement and project execution capability. It also strengthened Sanitech's ability to offer mobile and modular treatment systems through outright purchase, rental or rent-to-own arrangements.

"What began as a practical solution to support our core sanitation business has since evolved into a fully fledged water and waste treatment offering," adds Erasmus. Decentralised plants can reduce waste-haulage distances and create opportunities for reuse, turning a disposal problem into a water-management intervention.

Erasmus argues that wastewater treatment works should not regard portable sanitation waste as an additional burden. "We are providing a sanitation service. This is waste generated by your customers; we are simply bringing it to the treatment works by road instead of it arriving through the sewer network. Portable sanitation companies serve the public by collecting and transporting this waste safely."

One service does not fit every site

The required portable sanitation service changes sharply from one market to another. At events, the condition of the toilets can shape the public's view of the entire experience. On a construction site, procurement can become a numbers exercise focused on providing the minimum required units. Industrial operations tend to place greater emphasis on handwashing, separation from waste and frequent servicing. Underground mines introduce tight space, transport and handling constraints.

Unit design is only one variable. Service frequency can be just as important. A lightly used construction toilet may be serviced weekly, while units supporting a shutdown at an industrial plant may need attention before the day shift, at lunchtime and again before the night shift. In informal settlements, where one toilet may serve several households, more frequent servicing can be the most immediate way to improve hygiene and user experience.

The same site-specific thinking is needed as extreme weather becomes more disruptive. Flooded roads can prevent service vehicles from reaching units, while strong winds can overturn toilets and sandy ground can make anchoring difficult. An overturned unit filled with an inappropriate chemical creates a far greater environmental hazard than one using a carefully selected biological additive.

Ultimately, the measure of a sanitation service is therefore not the number of toilets delivered. It is whether people can use them with dignity, whether workers can service them safely and whether every load of waste reaches an authorised treatment or disposal point.

"That is what cradle-to-grave responsibility looks like in practice, and we give our customers peace of mind by embracing this concept," concludes Erasmus. ●



Delivering a toilet is only the visible part of a sanitation service

FITTED FOR THE FIELD: DIFFERENTIAL PRESSURE MEASUREMENT MADE SIMPLE



Differential pressure systems measure pressure differences between two points



VEGA's BAR3x, POINT21, PULS6X, and SWING61

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.



Precise measurements are needed for complex pressure systems often found in water and chemical applications

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. ●

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Utilising macadamia nut shells, a by-product of the nut industry, this biomass is transformed into high-grade activated carbons through a clean, eco-friendly and energy efficient thermal manufacturing process.

Rotocarb's novel technology operated under an exclusive license in conjunction with its strategic partners has created an agile, robust and competitive business that is able to offer premium grade activated carbons without the burden of MOQs, long lead times and duties suffered by imported alternatives.

Rotocarb's operations span across three provinces which collectively see to the production of over 1,500 tons of activated carbon annually across 20 product ranges. Rotocarb's facilities harness solar power, harvest rainwater and employ innovative autogenous thermal processes in the manufacturing of its products.

Rotocarb is South Africa's largest activated carbon manufacturer and is committed to growing the business locally and regionally whilst contributing to a sustainable future with its novel and high-quality activated carbon products.



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