


SMART INNOVATIVE

**CIVIL, MECHANICAL &
ELECTRICAL ENGINEERING**

SOLUTIONS

for the Sustainable Provision of Water and Sanitation

B BOFFIN
& FUNDI
SMART | INNOVATIVE | SOLUTIONS



We Tackle 10 Challenges To SOUTH AFRICA'S SUSTAINABLE PROVISION OF **WATER & SANITATION**

These challenges have significant implications for public health, economic development, and social well-being in South Africa.

- 1. WATER SCARCITY:** Droughts, population growth, and climate change have led to increased pressure on water resources and infrastructure.
- 2. AGING INFRASTRUCTURE:** The country's water infrastructure, including dams, pipelines, and treatment plants, is in dire need of maintenance and upgrades.
- 3. INADEQUATE ACCESS TO SAFE WATER:** According to some estimates, about 14% of South Africans still lack access to safe drinking water.
- 4. POOR SANITATION FACILITIES:** A significant portion of the population lacks access to adequate sanitation, leading to health risks and the spread of diseases.
- 5. WATER POLLUTION & CONTAMINATION:** Industrial activities, inadequate wastewater treatment, and improper disposal of waste poses risks to human health and ecosystems.
- 6. INEFFICIENT WATER MANAGEMENT:** Inefficient water management practices and inadequate water conservation measures, contribute to the water stress in the country.
- 7. FINANCIAL CONSTRAINTS:** Funding limitations and budget constraints present a major hurdle in addressing the water and sanitation challenges.
- 8. RAPID URBANIZATION & POPULATION GROWTH:** As cities and urban areas expand, the demand for water increases, straining existing infrastructure and resources.
- 9. DEMAND MANAGEMENT:** South Africa is vulnerable to the impacts of climate change, which can exacerbate water scarcity and demand management challenges.
- 10. LACK OF AWARENESS & EDUCATION:** Limited awareness about water conservation practices and the importance of demand management is another challenge.

Boffin & Fundi lead the drive to overcome these challenges, for the sake of public health, economic development, and the social well-being of all communities in our region of South Africa.

Sustainable Provision of Water and Sanitation via **SMART ENGINEERING SOLUTIONS**

Boffin & Fundi (Engineering) is a division of the black-owned and female-managed Boffin & Fundi (PTY) Ltd. Company that boasts over 50 employees.

Boffin & Fundi's Engineering Division specialises in the formulation and delivery of Civil, Mechanical and Electrical Engineering solutions in consultation with municipalities and enterprises in the public and private sector.

- Bulk Water Infrastructures
 - Wastewater Treatment
 - Storm Water & Roads
 - Water Conservation
 - Demand Management
-

Our engineering consulting pinpoints the nature of the challenges that our clients and their communities face. As part of the solutions to these challenges, we design and construct bulk water and wastewater infrastructures, and our proprietary Kingpin Aquaduct™ Leak Monitoring technology plays a big role in preventing water losses.



Boffin & Fundi radically **improves** the **performance** of municipalities and enterprises.

Our end-to-end public works solution spans consulting, project management, construction, reticulation, maintenance – and supply – of civil, mechanical and electrical engineering solutions for the sustainable provision of water and sanitation.

Applying Our Knowledge for Greatest Impact

EXPERIENCED CONSULTING SERVICES

Boffin & Fundi's core focus is upon the sustainable provision of basic needs – including water and sanitation.

Our Engineering Consulting Services

Our Engineering Consulting Services are backed with over two decades of experience, and focus on construction and refurbishment projects for bulk water infrastructures, wastewater treatment, storm water and roads, water conservation and demand management.

Our Engineering Consulting Processes

- Infrastructure Assessments
- Feasibility Studies
- Designs
- Contractor Evaluations and Appointments
- Progress Management and Reporting.

New technologies are one of the key long-term solutions for the water sector, and Boffin & Fundi are well positioned to play a key role in migrating clients and contractors from old to new technologies.

Our Project Management Services

Our Project Management Services include:


- Project communication and stakeholder management
- Project co-ordination, control and reporting
- Project Planning and Monitoring
- Water management systems
- Baseline and feasibility studies.

Civil Engineering Solutions for SUSTAINABLE PROVISION OF **WATER & SANITATION**

Boffin & Fundi provide civil, mechanical and electrical engineering solutions for the design, construction and refurbishment of wastewater treatment and bulk water Infrastructures.

Our Engineering Consulting Processes

- **Bulk Water Supply Scheme Design:**
We design and construct bulk water supply schemes, bulk infrastructure networks, reservoirs, pump stations and bulk pipelines.
- **Bulk Infrastructure Refurbishment:**
We repair bulk water infrastructures, including: pump stations, borehole equipment, reservoirs, bulk supply lines, bulk meters, manholes, control valves, and reticulation pipelines.
- **Bulk Infrastructure Installations:**
We provide for construction of wastewater treatment works, roads, reservoirs and bulk lines; bulk water and sanitation infrastructure (e.g., pump stations, borehole equipment, bulk meters, control valves and reticulation pipes).
- **Stormwater management and maintenance of stormwater systems:**
We deal with regulating the collection, storage, and movement of stormwater in the design of urban settlements and housing developments.
- **Establishment of Specifications:**
For borehole pumps and related systems.
- **Water Conservation and Demand Management:**
We provide an information management system, with consumer registers, flow and pressure monitoring, maintenance models, customer care, and management training.



Our Civil, Mechanical, and Electrical engineers work closely with other engineering disciplines to ensure **reliable** and **efficient** operation, while meeting safety, quality, and sustainability requirements.

Enhancing Efficiency and Awareness via SUSTAINABLE PROVISION OF **WATER & SANITATION**

Boffin & Fundi's Water Conservation and Demand Management Services include information management systems, consumer registers, flow and pressure monitoring, maintenance model, customer care and management training.

- Information management;
 - Consumer registers;
 - Flow and pressure monitoring;
 - Maintenance models.
-

Boffin & Fundi provides the technical expertise and project management oversight and advisory roles in initiating reticulation leakage detection and repair programs; community education, water conservation awareness campaigns, and strategic planning (water demand analysis).

Our many projects have helped in **reducing** water leakages, whilst **enhancing** efficiency in Water Conservation and Water Demand Management.

Mechanical Engineering Solutions for **ENHANCED WATER QUALITY & SUSTAINABILITY**

Boffin & Fundi's Mechanical Engineering capabilities play a crucial role in developing solutions for bulk water infrastructures. Our engineers contribute to the optimisation of these infrastructures by identifying opportunities for energy efficiency improvements.

Our Mechanical Engineering Services include:

- **Pumping Systems:**
Boffin & Fundi engineers design and optimise pumping systems for water distribution networks. This includes selecting appropriate pumps, designing pump stations, and determining optimal locations for adequate water pressure throughout the system.
- **Water Treatment:**
Our engineers contribute to the design and operation of water treatment plants and to the selection and sizing of equipment, such as clarifiers, filters, chemical dosing systems, and disinfection units.
- **Bulk Water Supply:**
Our engineers play a significant role in designing the distribution and transmission pipelines for bulk water supply. They consider factors such as pipe sizing, pressure requirements, and hydraulic analysis for efficient water transportation.
- **Storage Facilities:**
Our engineers contribute to the design of storage facilities such as reservoirs and water towers. They determine the structural requirements, considering factors such as water volume, load distribution, and water flow and pressure considerations.
- **Water Filtration and Separation:**
Our engineers are involved in the design and selection of filtration systems for removing impurities from water to achieve the desired water quality.

Our Mechanical Engineers identify opportunities for energy efficiency improvements, and also consider sustainable practices in system design and operation, such as rainwater harvesting, greywater recycling, and water conservation measures.

Boffin & Fundi also explore renewable energy integration possibilities, such as solar power or wind power, to reduce dependency on the grid and promote sustainability.

Electrical Engineering Solutions for **RELIABLE & EFFICIENT** WATER INFRASTRUCTURES

Boffin & Fundi's Electrical Engineers play a vital role in the design, operation, and control of bulk water infrastructures. They work closely with other engineering disciplines to ensure reliable and efficient operation, while meeting safety, quality, and sustainability requirements.

Our Electrical Engineering Services include:

- **Power Distribution and Transmission:**

Boffin & Fundi's Electrical engineers design power distribution systems for various components of bulk water infrastructures, such as pump stations, treatment plants, and control systems.

- **Motor Control and Drives:**

Our engineers design motor control systems for pumps, turbines, and other rotating equipment. They specify motor types and ratings, select appropriate motor control techniques, and design control panels for optimal performance, energy efficiency, and safety.

- **SCADA Systems:**

Our engineers are involved in the design and implementation of Supervisory Control and Data Acquisition (SCADA) systems that provide real-time data acquisition, control, and visualization of various parameters, such as water level, flow rate, pressure, and water quality.

- **Control Systems and Automation:**

Our engineers develop control systems for regulating and optimizing various processes within bulk water infrastructures. This includes designing and programming Programmable Logic Controllers (PLCs) and Distributed Control Systems (DCS) to automate functions like pump control, valve operations, and water treatment processes.

- **Instrumentation and Measurement:**

Our engineers select and install a wide range of sensors, transmitters, and meters to measure critical bulk water infrastructure parameters. These include flow meters, pressure and level sensors, water quality analysers, and more.

- **Power Backup and Uninterruptible Power Supply (UPS):**

Our Electrical Engineers design power backup systems to ensure uninterrupted operation of critical components in bulk water infrastructures.

- **Energy Management and Efficiency:**

Our Engineers analyse power consumption patterns and develop energy management strategies to optimise energy usage of bulk water infrastructures.



AQUADUCT™ CONTINUOUS ACOUSTIC MONITORING
MONITORING YOUR ENTIRE WATER SYSTEM
365 DAYS A YEAR

High-tech Leak Detection and Monitoring

AQUADUCT™ Automated Leak Monitoring System

Boffin & Fundi's Kingpin AQUADUCT™ is the complete and comprehensive solution for leak monitoring, repair and pipe maintenance.

Kingpin AQUADUCT™ employs **cloud-based** water leaks-monitoring software and hardware to analyse **acoustic signals** from fixed sensors on a 24/7 basis. These acoustic signals **pinpoint** small to large leaks while preventing **pipe bursts**.

The system informs you in real time with certainty when a leak is starting to develop, giving you its exact position long before the damage is caused. The AQUADUCT™ detection system is based on correlating sensors that integrate 3G cellular communication, GPS synchronization and cloud-based automatic signal processing.

Kingpin AQUADUCT™ automates the process and makes you less dependent on human expertise and less subject to human error.

24/7 Monitoring of your Entire Water System

CONTINUOUS ACOUSTIC MONITORING

Kingpin's AQUADUCT™ acoustic sensors are installed on the water supply infrastructure and can monitor the entire water system of a suburb, town or city, 365 days a year. Leaks are detected by Kingpin acoustic correlating sensors the moment they start.

These sensors transmit data via 3G cellular communication, increasing flexibility and bandwidth which enables more data to be sent and analysed on the server.

Easy Leak Location in Any Person's Hands

KINGPIN AQUADUCT™ MOBILE

Kingpin AQUADUCT MOBILE™ Leak Location Solution brings high-end technology to any person's hands. It is simple to use and contains all the equipment necessary for professional leak detection.

Our mobile technology includes a hand-held sensor, ground sensor, listening stick, correlators and hydrophone sensor to create a solution that surpasses conventional methods of leak detection by a mile.

Recordings and data is sent for analysis to the server via smartphone.

Actionable Tables, Charts and Maps

KINGPIN AQUADUCT™ WEB INTERFACE

You can observe your water system through the Kingpin AQUADUCT™ web interface at any time and make your own analysis of the leak map/GIS.

The system is easily deployed to suit user needs, and analyses the data, presenting it in an actionable manner, in tables, charts and on Google maps and Google street viewer.

The data is rich in detail and optimises leak analysis, system maintenance, history analysis, and sensor positioning.

AQUADUCT™ offers you many cutting-edge advantages and strong future benefit streams, including improved leak detection along with the system and tools to prevent collateral damage from pipe bursts.



GETTING THE BASICS RIGHT

SUSTAINABLE PROVISION OF WATER & SANITATION

The new Green Drop report shows that only **8%** of the country's current waste water infrastructure is in good working order. **25%** of people are still using the bucket system - the solving of our core problems lies in the **creation and maintenance** of basic infrastructures.

Boffin & Fundi's main emphasis is upon the sustainable provision of basic needs – water and sanitation. We count it both a **privilege and a powerful challenge** to lead the drive to get the basics right, for the sake of the future of all communities in our region.

A proud history of RADICAL PERFORMANCE IMPROVEMENTS

For the past 20 years, Boffin & Fundi has brought radical improvements to the performance of municipalities and enterprises in our region of South Africa. Our end-to-end public works solutions have spanned consulting, project management, construction, reticulation, maintenance and supply services.

Over the history of our projects, we have been able to overcome many of the challenges to the sustainable provision of water and sanitation at a municipal and enterprise level.

These achievements have made a significant difference to the public health, economic development, and social well-being in the areas in which we operate.

Here is a selection of projects and key impacts

Water conservation & demand management – Moretele Local Municipality

In 2013 Boffin & Fundi was appointed by Moretele Local Municipality for a 3-year Water Conservation and Demand Management project. The project entailed a desk top study to determine revenue losses and field work to determine non-revenue losses.

- Water conservation and demand management spanning information management system, consumer registers, flow and pressure monitoring, maintenance model, customer care and management training.
- Boffin & Fundi provided the technical expertise and (project management) oversight to the implementation of this project, which helped in significantly reducing water leakages, whilst enhancing water conservation and efficiency in water demand management.

Solutions

- Designed a meter replacement programme for several villages
- Installed bulk meters to create discreet consumption zones
- Updated consumer registers
- Log flow and pressure for several villages
- Maintained meter readings and water balance for 6 months for several villages
- Designed a maintenance model for all villages within Moretele
- Designed and implemented customer care management training.



Water & Sanitation Infrastructure Assessment – Moses Kotane Local Municipality

Boffin & Fundi was appointed in April 2021 as the engineering consultant for Matjhabeng Local Municipality. Boffin & Fundi will provide design for all infrastructure refurbishment and upgrades required for the sustainable provisioning of water and sanitation to the Matjhabeng community.

The work entailed designing a bulk water scheme that would extend coverage, designing infrastructure that would enable sustainable access to water.

- Assessment of all water and sanitation infrastructure
- Providing designs for upgrade and/or refurbishment works identified during infrastructure assessments
- Boffin & Fundi designed bulk infrastructure that would readily avail water to areas that had severe shortage, as well as eradicate sanitation blockages.

Solutions

- Delivered assessment report to support municipal fundraising activities
- Designed infrastructure assessment plan
- Delivered operating and maintenance plans to maximize infrastructure lifespan
- Log flow and pressure for Units 1 to 5 Mogwase
- Determined existing and future water requirements within the area
- Performed affordability assessment for Thabong wastewater treatment works
- Designed and implemented customer care management training
- Designed bulk infrastructure networks
- Designed wastewater treatment plants, reservoirs and pump stations
- Designed specifications for borehole pumps and related systems
- Designed 5km bulk pipeline.



Water conservation & demand management – Moretele Local Municipality

Boffin & Fundi was appointed in 2011 to provide specialist turnkey solutions for Moses Kotane Local Municipality to enable the provision of water to their most remote areas. The work entailed designing a bulk water scheme that would extend coverage and designing infrastructure that would enable sustainable access to water. **Boffin & Fundi designed all major infrastructure required for the sustainable provisioning of water to Moses Kotane's remote villages.**

- Designing bulk pipelines that would be integrated into the areas existing infrastructure
- Boffin & Fundi designed bulk infrastructure that would readily avail water to areas that had severe shortage.

Solutions

- Designed an information management system for MKLM
- Designed a meter replacement programme for Units 1 & 8
- Log flow and pressure for Units 1 to 5, Mogwase
- Determined existing and future water requirements for the area
- Maintained meter readings and water balance for 6 months for Units 1 to 8, Mogwase
- Performed affordability assessment for Unit 8, Mogwase
- Designed a maintenance model for Saulspoort
- Designed and implemented customer care management training
- Designed bulk infrastructure networks
- Designed reservoirs and pump stations
- Designed borehole pumps and related systems' specifications
- Designed 5km bulk pipeline.

Refurbishment, Water Conservation & Water Demand Management -

Moses Kotane Local Municipality

From 2012 to date, Boffin & Fundi has provided specialist services for MKLM. The work streams are focused on refurbishment (repairs/maintenance), water conservation and water demand management across various sub-projects. **The solutions adopted have significantly improved water demand management, whilst simultaneously solving water leakages in MKLM.**

Refurbishment Project 1:

- Repair all leaks and refurbish fittings and manholes on La Patri to Mabeskraal Bulk Pipeline
- Refurbish Mabeskraal and Tlhatlhaganyane pump stations
- Refurbish borehole equipment at Bapong and Tweelaagte
- Repair leaks on bulk supply to Bapong and Tweelaagte.

Refurbishment Project 2:

- Refurbish and improve Ledig Reservoir Inlet and Outlet
- Refurbish old Tlhatlhaganyane Pump Station
- Replace pumps at Mabeskraal Pump Station
- Refurbish Mogwase bulk meters
- Refurbishment of La Patri to Mabeskraal Bulk Pipeline
- Do condition audit of control valves at pump stations and reservoirs.

Refurbishment Projects 2013/2014:

- Refurbish bulk supply line from Tlhatlhaganyane to Maologane
- Refurbish control valves and reinstate telemetry
- Electrify and refurbish Seolong boreholes (2)
- Refurbish Matooster bulk supply line, booster pump station and boreholes
- Refurbish Mahobieskraal Boreholes
- Re-instate boreholes (5) in Mabeskraal
- Refurbish 4 vandalised boreholes in Tweelaagte.

Refurbishment Projects 2014/2015:

- Refurbish Mogwase Reservoir
- Refurbish and re-commission water softening plant at Disake
- Do groundwater assessment in Disake and Mokgalwaneng
- Madikwe WTW: Refurbish filters and electrical panels
- Refurbish electrical panels of borehole pumps in Mabaalstad
- Refurbish Uitkyk boreholes
- Refurbish Makwelleng bulk water supply.
- Refurbish bulk water supply from Madikwe to Tlokweng, including boreholes, booster pump stations, pipelines and reservoirs
- Design bulk water supply scheme to Lerome.

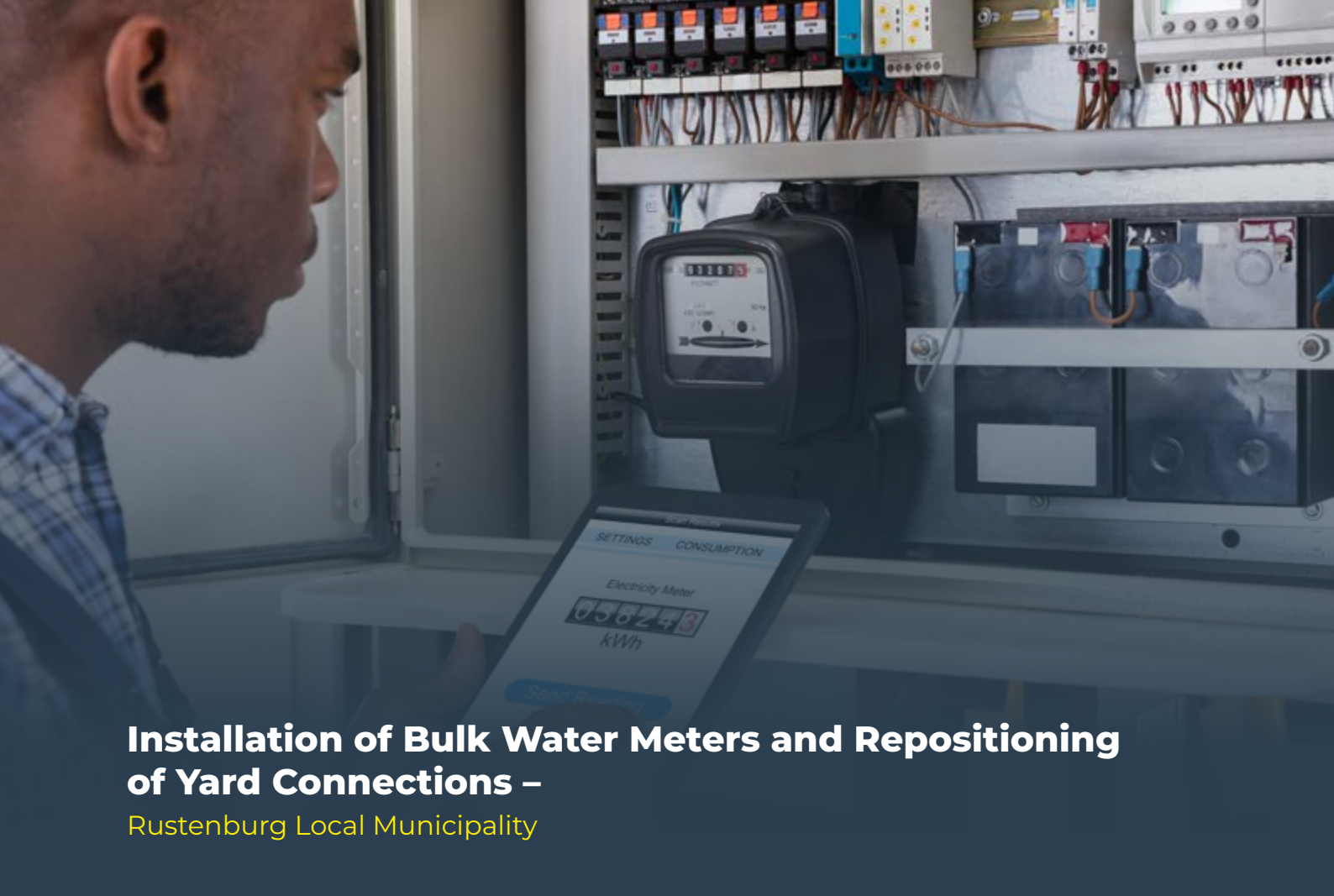
Refurbishment Project 2015/2016:

- Refurbish main reticulation pipelines in Saulspoort
- Do groundwater development in Disake and Mokgalwaneng
- Refurbish boreholes in Pella and do groundwater development
- Refurbish pump stations at Pella WTW
- Refurbish main reticulation pipelines in Pella
- Refurbish boreholes in Tlokweng
- Complete refurbishment of vandalised boreholes in Tweelaagte. Delays experienced because of bulk electricity supply interruptions
- Refurbish vandalised borehole in Mabeskraal.

Refurbishment Project 2015/2016:

- Drilling of boreholes
- Equipping boreholes
- Construction of pump houses
- Connection to existing tank
- Disinfection of pipeline and tank.

Boffin & Fundi has provided the technical **expertise** and project management **oversight** to the implementation of these projects, which has helped in significantly **reducing** water leakages, whilst **enhancing** water conservation and **efficiency** in Water Demand Management.



Installation of Bulk Water Meters and Repositioning of Yard Connections – Rustenburg Local Municipality

Project - Rustenburg Local Municipality

In 2014, Boffin & Fundi was appointed by Rustenburg Municipality as a specialist service provider to replace aging bulk water meters with new meters and move yard connections in several streets to the street for easy access. The project assisted the municipality to account for bulk water supply and have access to yard connection for reading and maintenance purpose.

Boffin & Fundi completed the project in 6 months

The project served to assist the Municipality to accurately calculate bulk water supply and thereby reduce water losses.

Some properties with yard connection where not accessible therefore making reading of the meter impossible. The project ensured these meters where accessible by moving yard connections to the street.

The project also identified properties where there were illegal connections.

Benefits included:

- Enabling the municipality to read and bill for water meters
- Enabling the municipality to account for bulk water supply.



Leak Detection Using Kingpin AQUADUCT™ Technology - Rand Water Pipelines

In July 2019, Boffin & Fundi was appointed by Rand Water, in a partnership to use satellite and leak detection technology to assist in the analysis, identification and location of leakages on Rand Water pipelines. Rand Water has more than 3500km water mains, spread over a large geographical area and with a diverse range of pipe sizes, materials and ages. The project enables Rand Water to reduce water losses and increase operational efficiency through new, innovative and efficient methods of leak detection that are non-intrusive and disruptive to their on-going operations.

- Supplying and installation of leak detection equipment and software
- Reporting on intensity of leaks and water savings achieved
- Providing real time alarms for detected leaks
- Creating a database of leakages and their related status
- Inputting information on existing maintenance schedules.

SMART CIVIL, MECHANICAL & ELECTRICAL ENGINEERING SOLUTIONS

for the Sustainable Provision of Water and Sanitation

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For smart, innovative civil, mechanical and electrical engineering services, contact us today.

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