Mpumalanga

Water Market Intelligence Opportunity Brief 2021

MPUMALANGA GREEN CLUSTER AGENCY

Mpumalanga Green Cluster Agency

Acknowledgements

Mbombela, South Africa

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviations & Acronyms	Meaning
AMD	Acid Mine Drainange
CER	Centre for Environmental Rights
CHP	Combined Heat and Power
COGTA	Cooperative Governance and Traditional Affairs
DBSA	Development Bank of Southern Africa
DEDT	Department of Economic Development and Tourism
DORA	Division of Revenue Act
DWS	Department of Water and Sanitation
ELU	Existing Lawful Use
ERRP	Economic Reconstruction and Recovery Plan
ESG	Environmetal, Social and Governance
GA	General Authorisation
GVA	Gross Value Added
IPAP	Industrial Policy Action Plan
IRP	Integrated Resource Plan
LM	Local Municipality
MIIF	Municipal Infrastructure Investment Framework

Abbreviations & Acronyms	Meaning
MLD	Mega Litres per Day
MPAP	Municipal Priority Action Plan
MuSSA	Municipal Strategic Self-Assessment
NBI	National Business Initiative
NBR	National Building Regulations
NDP	National Development Plan
NRW	Non-Revenue Water
NSSS	Non-Sewered Sanitation Systems
PGM	Platinum Group Metal
PPP	Public Private Partnership
RBIG	Regional Bulk Infrastructure Grant
SA	South Africa
SANS	South African National Standard
SDG	Sustainable Development Goals
SWPN	Strategic Water Partnership Network
WASH-FIN	USAID Water, Sanitation and Hygiene Finance Project
WC/WDM	Water Conservation and Water Demand Management

Abbreviations & Acronyms	Meaning
WSA	Water Service Authority
WSIG	Water Services Infrastructure Grant
WTW	Water Treatment Works
WUL	Water Use License
WULA	Water Use License Application
WWTW	Wastewater Treatment Works

Exchange rates used:
1 US Dollar = R16.23 (October 2020)

EXECUTIVE SUMMARY

This market opportunity brief is part of a series of first-of-its-kind reports that highlight investment opportunities in the green economy in Mpumalanga. It is written for investors who want to understand the opportunities for investment and job creation in green economy sectors in the province.

CLICK:
Celebrating green economy green shoots in Mpumalanga

Investment in the Mpumalanga water sector is driven from a need for water security to enable sustainable development and economic resilience. Water pollution from mining activities and constraints on service delivery are some of the key challenges that inhibit this investment. Furthermore, the National Water and Sanitation Master Plan (2019) estimates that in South Africa the gap between supply and demand could be 10% by 2030 even with the implementation of planned additional water supply projects.

Mining accounts for about 2% of water use in Mpumalanga, but has a major impact on water quality, affecting the availability and cost of water. Particular concerns are degradation and acidification of current or potential future water supplies and illegal mining, as well as the licensing backlog and irregularities in licensing processes. Water supplied through municipal-managed systems accounts for about 30% of water use in Mpumalanga.

This use includes domestic, industrial, commercial and institutional use. The majority of this use is in urban areas.

Substantial investment is needed into the restoration of existing infrastructure, as well for providing additional capacity for both water resources infrastructure (for which national government is responsible) and the water services infrastructure (for which municipalities are responsible). The capacity of national and local government to support the financing of these investments is limited, as a result of low water tariffs, high levels of non-revenue water and weak revenue collection.

This year's market opportunity brief presents key investment opportunities to improve water security and resilience as key enablers of sustainable economic development and socioeconomic development. Specifically, the brief focuses on the following opportunities in the municipal and industrial water market in Mpumalanga:

- **Bulk infrastructure upgrades of wastewater treatment works (WWTW)** is identified as a key investment opportunity due to the majority of WWTW operating above capacity as a result of population growth and urbanisation within the province, severly polluting downstream surface water.
- Reducing **non-revenue water** is important for achieving water security and reliability of supply, as well as municipal revenue recovery for maintenance, and to enable future capital expenditure.
- **Innovative decentralised water treatment technologies** within the industrial sector is a key area of development in the water sector. Poor municipal service delivery has led to industries investing in decentralised water treatment systems to ensure sustainable operations.

Opportunity	Key drivers	Barriers	Expected timeframe	Macro-environment
Bulk Infrastructure Upgrades: WWTW (Municipal Sector)	• Poor raw water and drinking water quality. • Effluent discharged into water sources does not meet regulatory standards. • Regulatory compliance and reinstatement of the Green Drop Programme. • Water demand is escalating in a number of towns such as Mbombela, White River, Middelburg and eMalahleni due to urbanisation. • Increased demand for good quality raw water for downstream users particulary rural residents and neighbouring countries. • Key provincial development plans: (1) Mpumalanga Vision 2030 Strategic Implementation Framework, (2) Mpumalanga Economic Growth & Development Path, (3) Mpumalanga Spatial Development Framework.	• Municipalities have a lack of technical capacity. • Lack of project development and preparation expertise. • Access to funding – limited access to grant funding.	0 – 5 years	• The 2014 Green Drop Report[1] indicated that 41% (7 out of 17) of the municipalities in Mpumalanga were classified as critical risk Water Service Authorities (WSA), with eight being high risk and only two municipalities scoring a medium risk rating as a WSA. • The 2019/2020 municipal audit report indicated that only three municipalities (Steve Tshwete Local Municipality, Nkangala District Municipality and Ehlanzeni District Municipality) received a clean audit. • Majority of WWTWs in Mpumalanga operate well above the design capacity. Collective designed capacity 610 MLD; current operating capacity 750 MLD. • The province has a large rural population where some settlements are transitioning to urban areas due to natural clustering.
Non-Revenue Water (NRW)[2] (Municipal Sector)	• Cost savings and increased revenue (due to reduced water loss and wastage). • NRW projects demonstrate short payback periods. • Increased project preparation support.	• Lack of municipal technical capacity. • Complex procurement and financing models. • Access to funding. • Political will to address this issue. • Current state of infrastructure due to lack of maintenance and capacity to address this.	0 – 5 years	• Provincial NRW currently at 46.2% (representing R3.6 billion in lost revenue per annum) with some NRW data available at some local municipalities (LMs): Emalahleni LM 47%, Govan Mbeki LM 21%, Mbombela LM 42% and Steve Tshwete LM 31% (dataset for 2020). • 15% reduction in NRW target nationally by 2030, supported by a seed investment of ~**R 676 mil** by the Department of Water and Sanitation to realise **~R 7.3 bn** per year in savings in bulk water cost.

[1] Green Drop Certification Programme for Wastewater Quality Management Regulation: The Green Drop process measures and compares the results of the performance of water service authorities and their providers via a standardised scorecard, and subsequently rewards (or penalises) the municipality upon evidence of their excellence (or failures) according to the minimum standards or requirements that has been defined.

[2] Non-revenue water (NRW) is the volume of water supplied by a water services provider (water utility) for which it receives no income due to various factors, including water losses, metering errors, billing errors, theft, and unbilled authorised consumption.

Opportunity	Key drivers	Barriers	Expected timeframe	Macro-environment
Innovative Decentralised[3] Water Treatment Technologies (Mining; Power Generation Sectors and Agroprocessing)	• Water treatment required for raw water sources due to poor raw water quality and increased pollution. • High and increasing energy costs promoting exploration of energy efficient water treatment technologies with low operations and maintenance requirements. • Stringent effluent discharge standards due to local ecological degradation. • Improved financial viability of non-potable reuse options, such as agri irrigation and reuse for process water due to fit-for-purpose treatment trains. • Environmental, Social and Governance reporting and targets. • Liquid waste to landfill ban (also an opportunity).	• Most mines are remote where some technology types are difficult to implement and monitor. • Regulatory authorities are risk averse to new technologies from a water use licensing perspective. • Long waiting periods for water use licensing applications. • Lack of clarity over key pieces of legislation: mine water closure and rehabilitation, mine water irrigation regulations and financial provisions for mine closures. • Public perception and health risks on use of treated effluent. • Access to information on best practice & locally validated technologies. • Access to capital. • Operational complexity.	0 – 5 years	• Current mining projects in Mpumalanga include 68 Coal, 19 Industrial, 14 Platinum Group Metals, 13 Gold, 5 Nickel, 3 Iron Ore and 1 Chrome. • The province produces 83% of the countries coal. • The province currently hosts 12 power stations: 7 coal-fired operating, 4 coal-fired shortly to be repurposed and 1 coal-fired new build. • In 2016 it was estimated that water use in coal mining totalled to 53.8 million cubic meters per annum with a large portion ending up as wastewater. • The estimated water use in coal-power generation is ~3 184 L per MWh. • Mine and groundwater is contaminated with mainly sulphates. • Mines often take on the responsibilities of local governments to provide water and sanitation for local mining communities. • Manufacturing sector such as petroleum and agro-processing is struggling to meet production targets due to poor municipal service delivery and thus investing in decentralised water treatment solutions for sustainable operations.
SUB-OPPORTUNITY: Wastewater Management (Brine[4] Streams: Mining and Power Generation Sectors)	• Stringent discharge standards and licensing requirements for the establishment of brine ponds. • Liquid waste ban to landfills took effect this year (2021). • Water demand increases beyond supply driving the implementation of reuse strategies. • Increasing disposal and transportation costs.	• Lack of commercially ready technologies. • Lack of technical capacity. • Poor business case for most of the technologies.	5 – 10 years	

[3] Decentralised treatment is a practice of placing water or wastewater treatment at the site of supply, demand or ideally both. It is a flexible, sustainable alternative to large treatment plants that require costly supply and delivery infrastructure.

[4] Brine is characterised by a waste stream high in salt content (>5%) and a leachable concentration for total dissolved solids of >100 000 mg/L.

Opportunity	Key drivers	Barriers	Expected timeframe	Macro-environment
SUB-OPPORTUNITY: Non-sewered sanitation solutions (Mining Sector)	• Municipal wastewater treatment works operate beyond design capacity due to mushrooming of mining communities. • COVID-19 pandemic reemphasised the need for universal access to sanitation. • Need for rapid implementation options. • Constraints on development due to lack of bulk infrastructure. • Strategies and government initiatives that aim for the provision of universal access to sanitation. • Increase in water and sanitation related service delivery protests. • Pollution of water courses by informal settlement dwellers using them for disposal of waste including faecal matter. • Lack of availability of potable water to flush toilets and use for water borne sanitation.	• Policies, bylaws and regulations make it onerous to install non-sewered sanitation solutions (NSSS). • Public acceptance of alternative sanitation solutions. • Negative perceptions of cost and maintenance requirements.	0 – 10 years	–

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Wastewater management (brine) is an emerging opportunity in the mining and power generation sectors in Mpumalanga.

1.

THE MPUMALANGA GREEN CLUSTER AGENCY

Introducing the Mpumalanga Green Cluster Agency

Clusters can create the context to build trust between sector players, and work to unlock new mechanisms to enhance competitiveness and resilience. The Green Economy, in particular, lends itself to collaborative ecosystem building approaches. Set in this system of rapidly changing technology, and the economics surrounding that technology, are commitments to social inclusion, and greater equality.

The opportunity to use a cluster to build trust, remove barriers and unlock jobs and investment has been recognised as an opportunity to make a contribution to the regional economy in Mpumalanga.

The Mpumalanga Department of Economic Development and Tourism, working with GreenCape and with support from the international development finance community, has set up the Mpumalanga Green Cluster Agency.

This cluster will focus on unlocking and unblocking economic opportunities in the green economy, with the aim of making a contribution to regional economic diversification and job creation efforts.

The Mpumalanga Green Cluster Agency's mission is to stimulate a vibrant green economy for communities in the Mpumalanga province, underpinned by a collaboration between government, business and academia. The vision is a vibrant, green and sustainable economy in the Mpumalanga province, that leverages the province's rich natural resources and heritage to create a legacy for South Africa low carbon economic growth.

Collaboration through clustering on a local scale to build competitiveness on a global scale will support the growth of the green economy in Mpumalanga, and determine the green cluster in Mpumalanga's success. To become a member of the Mpumalanga Green Cluster Agency, please sign up here.

Green Economy Market Opportunity Briefs

This market opportunity brief is part of a series of first-of-its-kind reports that highlight green economy investment opportunities in the green economy in Mpumalanga. It is written for investors who want to understand the opportunities for investment and job creation in green economy sectors the province.

Each brief provides an overview of the market within a sector, including key developments and achievements, the key players, legislation and regulation, market opportunities and challenges, and funding opportunities.

This brief focusses on the green economy investment opportunities in the water sector. To access the other sector briefs, please visit: http://www.mpumalangagreencluster.co.za/

2.

SECTOR OVERVIEW

2.1.

South African Context

South Africa (SA) is ranked as the 30th driest country in the world and has been characterised as a water scarce country; with low rainfall and high rainfall variability as a result of climate change. In 2021 the water crisis ranked as the third highest risk for doing business in SA, behind unemployment (WEF 2021) which is currently at 32.6% (Reuters 2021), and failure of critical infrastructure for energy generation. In addition to being a water-stressed country, South Africa is also characterised by an uneven rainfall distribution, and extreme climate resulting in evaporation rates that often exceed precipitation. The country has a reliable yield (i.e. supply from current infrastructure) of ca. 15 billion kl/year (at 98% assurance of supply – or 2% annual probability of supply failure). The majority of this yield is from surface water (68%) and return flows that support surface water (13%), as shown in **Figure 1**.

Agriculture is the largest water use sector (61%), followed by municipalities (27%), which covers residential, commercial, and industrial water users supplied by municipalities (**Figure 2**; DWS 2019a). The relative proportion of municipal and agricultural use differs between provinces and municipalities, depending on human settlement patterns and the local economy. Revenue from the sale of water and provision of sanitation services in South Africa in 2019/20 totalled R51.6 billion and R20.6 billion respectively (StatsSA 2020). The distribution of this value among water users is shown in **Figure 3**. From the municipal sales, about 58% typically comes from domestic residential use, and 40% from commercial and industrial use.

Figure 1: Water sources in South Africa[5] (DWS 2017a)

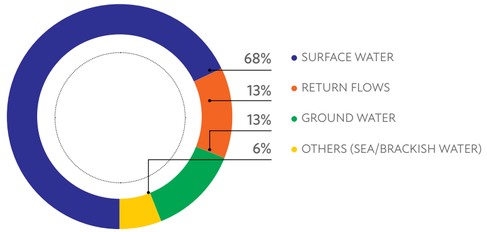
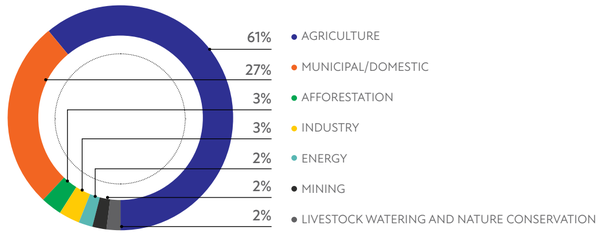
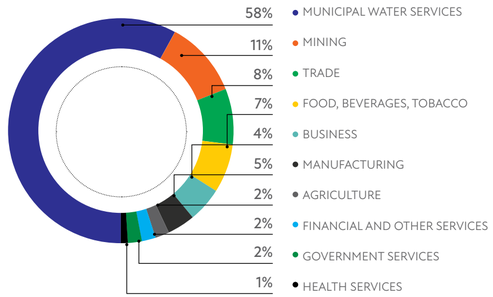


Figure 2: Water use in South Africa (DWS 2019a)



[5] 'Return flows' refers to water that is used and then recycled

Figure 3: Financial value of water sales by sector (GreenCape 2017)



Despite South Africa being a water-scarce country, the national average consumption is around 233 litres/capita/day (l/c/d). These figures are much higher than the international benchmark of 173 l/c/d (DWS 2019a)[6]. Forecasts indicate that water demand will exceed supply by 10% by 2030 (DWS 2019a). This will be driven by low water tariffs, inefficient use, inadequate cost recovery, leakages, inappropriate infrastructure choices (e.g. water-borne sanitation in a water-scarce country), and increased demand in the municipal, industrial, and agricultural sectors (Donnenfeld et al. 2018).

The growth in demand by the municipal sector is expected to be the greatest, which is partly driven by urbanisation, but also by increased industrial production, commercial activity, and population growth.

A model of the future water balance for South Africa indicates that if planned additional water supply is added, and realistic water efficiency[7] is achieved, the gap between supply and demand by 2030 can be narrowed substantially (**Figure 4**; DWS 2019a).

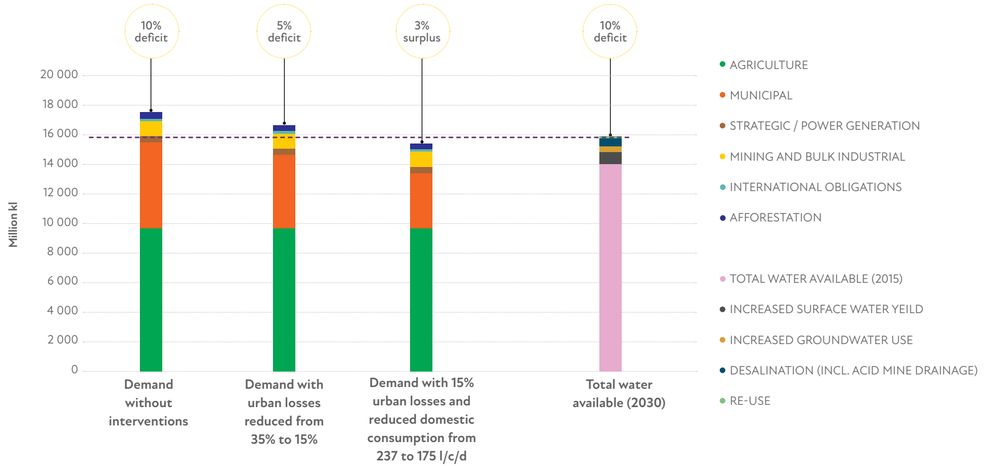
The additional water supply sources are mainly groundwater, desalinated seawater in coastal areas, and wastewater reuse. The largest new water sources are planned in the Orange River and Vaal River catchments, followed by the Western Cape and Richards Bay (DWS 2019). Furthermore, implementation of adaptation projects that promote water conservation and water demand management (WC/WDM) would aid in narrowing the supply-demand gap. Some projects such as the *Working for Water* and *Working for Wetlands* programmes that involved the removal of alien trees and protection of water resources,

respectively, have been implemented and are expanding to encourage further job creation (DFFE 2020).

The recently published national economic reconstruction and recovery plan (ERRP) highlights the retrofitting of public and private buildings with technologies to improve water efficiency as a major part of South Africa's green agenda. The extension of the programme to public buildings has the potential to build a labour intensive local industry (Presidency 2020).

[6] These figures are based on the system input volume divided by the population served. The system input volume includes commercial and industrial demand, and water losses through infrastructure leaks.
[7] The water demand management target aims to reduce the per capita water consumption by 26% from 2018 to 2030 to match the international benchmark. During the 2016-2018 drought in the City of Cape Town, a far greater (~50%) per capita reduction in water consumption was achieved over a period of four years, which suggests that this target is very much achievable.

Figure 4: National water balance projections by 2030 with and without critical interventions (DWS 2019a)



While total demand is projected to increase despite increased efficiency, and planned augmentation schemes can narrow the supply gap, it is important to note that the augmentation sources must be diversified.

An estimated 40% of South Africa's wastewater is untreated (Donnenfeld et al. 2018). Furthermore, ~56% of the more than 1 150 municipal wastewater treatment works (WWTWs) and ~44% of the 962 water treatment works (WTWs) in the country are in a poor or critical state, while ~11% of the WWTWs are completely dysfunctional.

The resulting raw water pollution from untreated wastewater and poorly managed WWTWs presents a significant environmental challenge, as well as a health and socio-economic risk to vulnerable communities that access water directly from rivers.

Additionally, poor surface water quality increases treatment costs for potable uses as well as downstream industrial uses, and has a negative impact on agricultural yields. In 2019, approximately 90% of households had access to piped or tap water in their dwellings, either off-site or on-site, and ~83% had access to improved[8] sanitation facilities (StatsSA 2019a).

[8] These facilities are defined as flush toilets connected to a public sewerage system or a septic tank, or a pit toilet with a ventilation pipe.

However, insufficient water infrastructure maintenance and investment, vandalism, urbanisation, and immigration may have hampered growth or led to the negative growth in access to water and sanitation. Meeting the Clean Water and Sanitation Sustainable Development Goal (SDG 6) and National Development Plan's (NDP) 2030 targets relating to water and sanitation will require investing towards rapid acceleration of infrastructure provision towards service delivery (UN-Water 2020; NPC 2012).

It is estimated that ~R90 billion per year of investment is needed in water and sanitation infrastructure over the next 10 years (DWS 2017a; DWS 2019a) in order to ensure reliable water supply and wastewater treatment. This includes refurbishing and upgrading existing infrastructure, and new infrastructure to support population and economic growth. Budgeted funding of R54.2 billion in 2020/21 falls well short of what is required, but estimated medium-term budgets indicate that the national government has plans in place to reduce the shortfall (Table 1).

Table 1: Required, budgeted, and projected public sector funding for water & sanitation services & infrastructure (National Treasury 2021)

Funding (R billion)	Revised Estimate 2020/21	Medium term estimates 2021/22	Medium term estimates 2022/23	Medium term estimates 2023/24	Average year-on-year increase
Community development:	**16.1**	**16.7**	**17.3**	**17.9**	**3.6%**
Regional and local water and sanitation services (subsidies for free basic services)	10.9	11.2	11.8	12.2	4.0%
Portion of human settlements (provincial) spent on water and sanitation	5.2	5.5	5.6	5.7	2.8%
Water and sanitation infrastructure:	**38.1**	**34.8**	**40.2**	**39.9**	**1.6%**
Water resource and bulk infrastructure	28.6	25.7	30.6	30.0	1.6%
Regional Bulk Infrastructure Grant	6.1	5.4	5.8	6.0	-0.7%
Water Services Infrastructure Grant	3.4	3.6	3.7	3.9	4.7%
Total planned public sector funding for water and sanitation	**54.2**	**51.5**	**57.5**	**57.8**	**2.2%**
Total estimated annual capital requirements (DHSWS 2019):	**90.0**	**90.0**	**90.0**	**90.0**	–
Water supply infrastructure	70.0	70.0	70.0	70.0	–
Wastewater infrastructure	20.0	20.0	20.0	20.0	–
Funding shortfall	**-35.8**	**-38.5**	**-32.5**	**-32.2**	**-3.5%**

2.2.

Mpumalanga Provincial Context

The Mpumalanga Province is the second smallest province in South Africa but contains almost half of the country's high potential arable land. Mpumalanga is home to vast coalfields, which plays a major role in national power generation and also garners significant revenues from coal exports. The bulk of the country's coal-fired power stations are located near the supplying coal mines. Another large consumer of coal in the province is the coal-to-liquid fuel plant at Secunda owned by Sasol.

Mpumalanga lies in the country's summer rainfall area and has a diverse climate due to changes in altitude in the two topographic areas, the Highveld and Lowveld. The mean annual rainfall in the province ranges from 593 – 748mm in the Lowveld area and 748 – 971mm in the Highveld area.This high rainfall region in the center of the province is indicated by the hatched area entitled "**Strategic Water Source Areas**" in Figure 5. Annual evaporation generally increases from east to west across the province from 1 800 to 2 200 mm per annum (Simpson et al. 2019). In the south-west, water drains inland toward the Vaal River system.

The south-eastern portion of the province flows across the national border with Swaziland. Runoff that is generated in the northern portion of the province drains predominantly in direction toward the Limpopo and Inkomati Rivers, which also passes through Kruger National Park and subsequently into Mozambique.

In 2017, the total water use in the province was estimated to be 5 580 MLD with an approximate deficit of 4% (DEDT 2019). In a low economic growth scenario projected until 2030, water use is expected to increase by 1.6% per annum to 6 821 MLD. Water demand in the province is mainly dominated by the agriculture and power generation sectors as shown in Figure 6. Table 2 presents the current water resource balance within the province (Balzer 2020). The majority of the supply systems within the provinces is under pressure with groundwater being considered as a future water source.

Figure 5: Map of water management areas, main rivers and major towns within the Mpumalanga Province (Simpson et al. 2019)

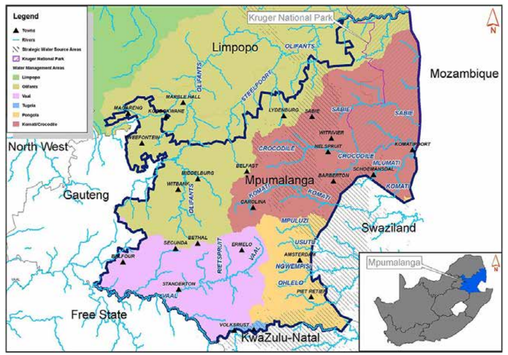


Figure 6: Share of water use in Mpumalanga (DEDT Mpumalanga 2019)

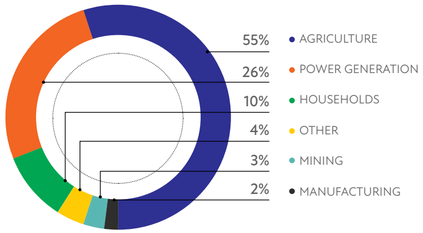


Table 2: Mpumalanga water resource systems balance (Balzer 2020)

Water supply system	Major water users	System water balance	Major dams in the system	Future water sources
Upper Usuthu	Chief Albert Luthuli LM; Eskom; Irrigation; Gauteng; Mkhondo	Stressed	Heyshope, Morgenstoond, Westoe, Jericho	Groundwater
Upper Olifants	Eskom, Irrigation	Stressed (water quality issues)	Witbank, Loskop	Treatment of mine affected water
Upper Vaal	Standerton, Eskom, Sasol, Secunda	Balanced	Grootdraai	–
Upper Inkomati	Chief Albert Luthuli LM, Mining, Irrigation, Eskom	Balanced	Lomati dam, Boesmanspruit, Nooightgerdact, Vygeboom	–
Lower Inkomati	Nkomazi LM, Transboudary Flow, Irrigation	Stressed	Driekoppies dam and various smaller dams	Groundwater
Crocodile	Mbombela LM, irrigation	Stressed	Kwena and various farm dams	Crocodile East Water Project (dam development)
Sabie	Bushbuckridge	Balanced	Inyaka, Mwarite and various small dams	Groundwater

LM = Local Municipality

2.2.1. Municipal Market

The Mpumalanga Province has three district municipalities and 17 local municipalities. All 17 local municipalities have been given the status of Water Service Authorities (WSA). The municipal audit report of 2019/2020 indicated that only three municipalities (Steve Tshwete Local Municipality, Nkangala District Municipality and Ehlanzeni District Municipality) received a clean audit. Approximately 10.8% of the local population do not have access to water and the province has a sanitation backlog of approximately 3% (see detailed figures in Figure 7).

In a study conducted by Statistics South Africa, it was determined that 71% of the total income of municipalities was self-generated with the balancing 29% coming from government grants and subsidies as well as donations and contributions. The Municipal Infrastructure Investment Framework (MIIF), developed by the Department of Cooperative Governance and Traditional Affairs (COGTA) together with the Development Bank of South Africa (DBSA) categorises local and metropolitan municipalities into five groups: metropolitian municipalities (A), secondary cities (B1), municipalties with a large town as its core (B2), municipalities with small towns (B3), and municiplaities that are predominatly rural (B4).

District municipalities are allocated the designations C1 (those that are not water service providers) and C2 (those that do provide water as a service). The MIIF classification of the 17 local municipalities in the province is presented in Figure 8. Data from the national *Financial Census of Municipalities* (StatsSA 2020) report fitted to the MIIF categories indicated that in 2020 approxiamtely 61% of municipalities in small towns (B3) and 28% of rural municipalities (B4) managed to generate their own income (see Figure 9). In Mpumalanga, 11 of the 17 municipalities are classified as B3 and B4 municipalities, emphasising their dependence on alternative funding sources.

Figure 7: Water and sanitation provision as of 2016 (Balzer, 2020)

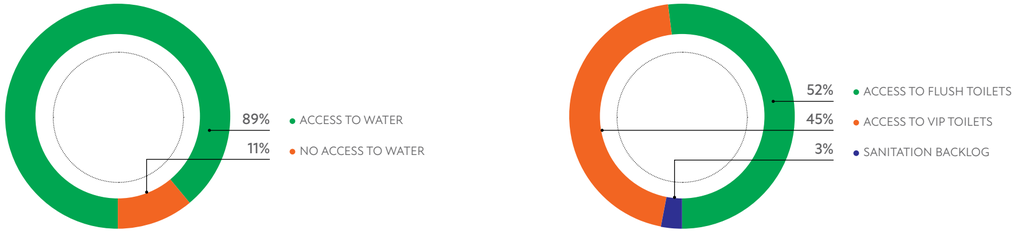


Figure 8: Mpumalanga municipalities Municipal Infrastructure Investment Framework (MIIF) categorisations (StatsSA 2020)

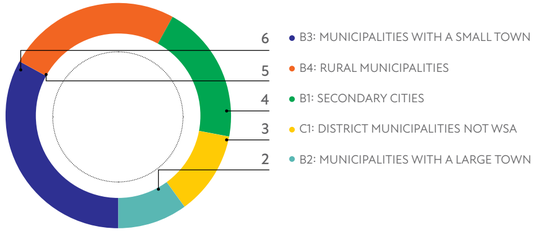
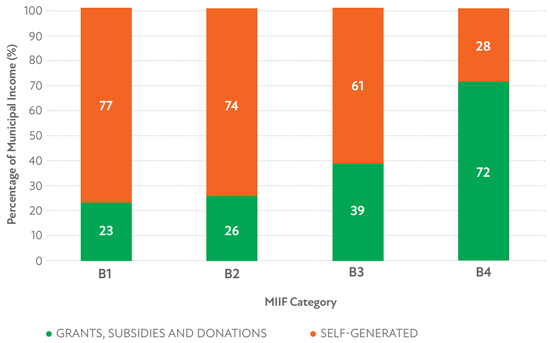


Figure 9: Breakdown of municipal income by source and Municipal Infrastructure Investment Framework categories – all South African municipalities (StatsSA 2020)



Government grants and subsidies include two forms of intergovernmental fund transfers, namely general purpose (i.e. unconditional) and specific purpose (i.e. conditional) grants. Municipalities can use unconditional grants for a variety of purposes at their own discretion. Conditional grants, on the other hand, are transferred to municipalities with the specific condition that the funds are used for maintaining infrastructure, such as roads, pipes, and wastewater treatment plants. These grants often fall short of what is financially required for water projects and often alternative funding sources are required.

There are, however, a number of barriers within the national municipal market, one of which can generally be described as *capacity*[9]. An analysis of municipalities in South Africa that captures various aspects of 'capacity' as they relate to water projects, indicates that only about 23% of municipalities have a 'good' score related to capacity to implement water projects (Figure 10 and 11). Similarly, the National Business Institute (NBI) found that only ~20% of municipalities in South Africa were suitable for public-private partnerships (PPPs) (NBI 2019). Municipalities were evaluated based on capacity and financial standing.

One further barrier is that smaller municipalities do not have credit ratings to compete in credit markets to access finance. WASH-FIN[10] has recently assessed the credit-rating of 21 selected intermediary (secondary) municipalities, with 18 of these resulting in an investment grading. This indicates that there is a possibly greater potential for external financing for intermediate municipalities than is currently being realised. There may be several reasons for this and these could vary among municipalities, but could include low appetite for debt, the long-term nature of infrastructure financing vs shorter term political cycles, or technical and managerial staff turnover.

The municipalities with 'intermediate scores' on the Municipal Grading Index (see footnotes for details) in most cases need interventions to assist them in accessing credit for infrastructure projects. In addition, these municipalities are well suited to projects that do not necessarily require debts, such as bulk water and wastewater treatment efficiency and optimisation retrofits. Based on the analysis several municipalities in Mpumalanga are deemed good/green and the majority are intermediate/yellow with only a few being poor/red.

[9] The criteria used included **skills / capacity of senior/executive municipal staff** to manage municipal finances effectively and manage infrastructure projects; **financial standing of the municipality** to access commercial or development finance institution (DFI) finance; **skills / capacity at the water department staff** to successfully motivate for and implement water infrastructure projects.

[10] https://www.globalwaters.org/WASH-FIN

Figure 10: Geographical distribution in South Africa according to the Municipal Grading Index (UNIDO 2019, GreenCape analysis), indicating Good (green), Intermediate (yellow) and Poor (red) scores based on capacity criteria (see text and footnotes for details)

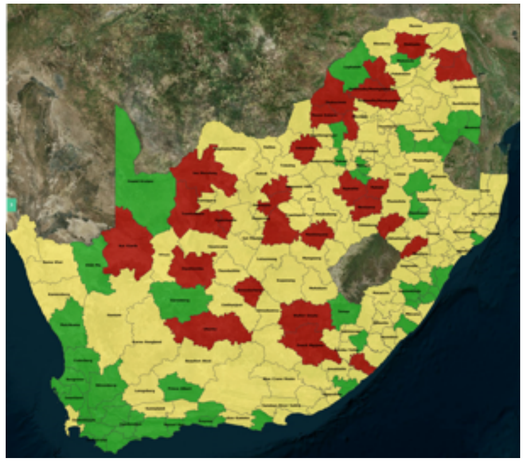
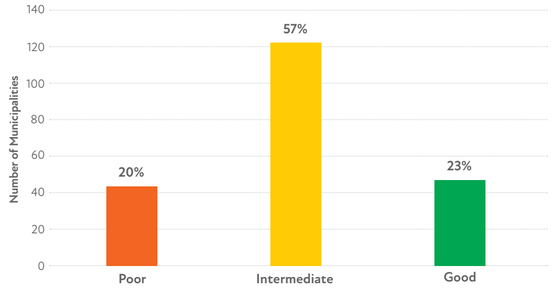


Figure 11: Number of municipalities in South Africa according to the Municipal Grading Index (UNIDO 2019, GreenCape analysis), indicating Good (green), Intermediate (yellow) and Poor (red) scores based on capacity criteria (see text and footnotes for details).[11]



[11] An interactive version of this map can be found at by clicking on this link.

The eMalahleni Water Reclamation Scheme is a good example of a private and public-sector partnership between mining companies and the local government to address regional water quality and quantity challenges. Mines in the area shared several risks such as rising mine water levels and watersource contamination.

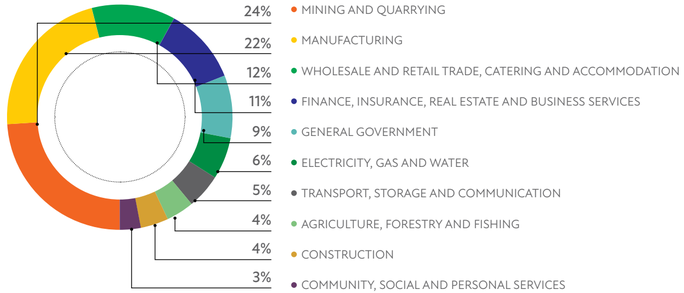
This resulted in deterioriating regional water quality. In addition, the local municipality of Emalahleni faced severe water supply challenges and there were social unrest due to concerns over service delivery. The reclamation scheme was constructed to address the challenge of excess mine water and to supply potable water to the local municipality.

2.2.2. Industrial Market

2.2.2.1. Overview

Mpumalanga has a strong industrial sector ranging from the mining, manufacturing to power generation. The provincial gross value added (GVA) by sector is presented in Figure 12 with the mining and manufacturing industries contributing significantly to the local economy.

Figure 12: Mpumalanga provincial gross value added (GVA) by sector for 2020 (Quantec EasyData 2021).



2.2.2.2. Mining Sector

Mpumalanga is home to rich deposits of coal, iron ore, platinum group metals (PGMs) and industrial metals such as nickel and chrome. Current mining projects in Mpumalanga include 68 Coal, 19 Industrial, 14 Platinum Group Metals, 13 Gold, 5 Nickel, 3 Iron Ore and 1 Chrome. Mining and related activities require a substantial amount of water while impacting the environment and surrounding water quality. The development of new mines in water scarce areas requires meticulous water demand management as well as waste water management. The water allocation to the mining industry currently represents 2.5% of the total water allocaton in South Africa. The Department of Water and Sanitation commissioned a study in 2016 to determine indicative water use efficiency benchmarks for commonly mined minerals in South Africa highlighting potential opportunities for water demand management. This study confirmed that the proposed procedures for Water Conservation and Demand Management Guidelines should be used in the internal mine water use target setting processes.

Various river systems in the province such as the Olifants River have been significantly impacted in terms of quality due to nearby coal mining. The Olifants River catchment has experienced over 100 years of coal mining and now has some of the poorest water quality in South Africa. The water quality of the Olifants River is such that it cannot be utilised by Eskom (the national power utility) in its new coal fired power station Kusile because the water is too polluted. Irresponsible and unregulated mining as well as poorly inforced regulations are aspects leading to the decline in water quality in Mpumalanga (Simpson et al. 2019).

Long term water quality data indicated that the total dissolved salt content (sulphate being the major constituent) frequently exceed resource water quality objectives.at sites upstream of the eMalahleni and Middelburg dams. Surface and groundwater qualities are negatively impacted by mine water run-off due to the abundance of mining activities within the province. In 2010, an Expert Committee of the Inter-Ministerial Committee, established to assess the threat posed by acid mine drainage (AMD), identified the Mpumalanga coalfields as one of six vulnerable areas that require monitoring.

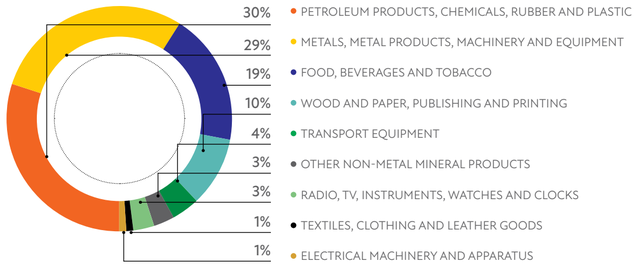
The mining sector has developed a guideline and calculator tool for the development and implementation of water conservation and water demand management [12] in line with the 15% water consumption reduction target set forth by the NW&SMP for the mining sector.

2.2.2.3. Manufacturing Sector

The manufacturing sector is sized at a gross value added (GVA) of R157 million for 2020. The GVA distribution of the manufacturing sector sector in Mpumalanga is presented in **Figure 13** with petroleum products and metals being the largest contributors.

Further complementing the manufacturing sector is Mpumalanga's rich agricultural produce which is used by companies like McCain, Nestlé and PepsiCo in their production. There are also pulp and paper plants (Sappi and Mondi), fertiliser facilities and textile manufacturing. The decision by Sappi to start producing dissolving wood pulp at its Ngodwana Mill has significantly increased the manufacturing capacity of the province. York Timbers is a leading forestry company and the sugar mills and refinery of RCL Foods are large contributors to the provincial economy. The Fresh Produce Market in Mbombela is planned to accommodate investors who want to start factories to manufacture products such as juice, or packaging firms. Land has been bought and registered for the required use in Mbombela as the Mpumalanga International Fresh Produce Market.

Figure 13: Gross value added (GVA) of various sub-sectors within the manufacturing sector in Mpumalanga for 2020 (Quantec EasyData).



[12] https://www.mineralscouncil.org.za/work/environment/environmental-resources/send/26-environmental-resources/591-guideline-for-the-development-and-implementation-of-water-conservation-and-water-demand-management-plans-for-the-mining-sector

A major hinderance to investment in the manufacturing sector is poor service delivery by local municipalities. In June 2021, Astral[13] had to pay its staff R3 million in overtime wages to meet production targets which were impacted by interruptions in power and water supply. Most manufacturing companies are thus turning to decentralised water supply and treatment to ensure sustainable operations. The need and opportunity for decentralised water treatment technologies is further highlighted by the delay in the Lesotho Highlands Project placing the local Vaal River Catchment under severe pressure and impacting water supply to leading manufacturing companies such as Sasol.

2.2.2.4. Power Generation Sector

The energy sector, including the national power utilty Eskom, is highly dependent on reliable and high quality supplies of water for the generation of electricity. The Mpumalanga Province hosts 12 coal fired power stations: 7 coal-fired operating, 4 coal-fired shortly to be repurposed and 1 coal-fire new build. An elaborate water reticulation network and storage schemes have been developed to support this sector to ensure reliable power generation. In turn, the water sector is highly dependent on the power generation sector for water distribution via pump stations. Eskom's power plants have diverse technical parameters and use a combination of cooling technologies to provide fit-for-purpose water for various process steps.

Mpumalanga, hosting the majority of coal mines, lies at the heart of the Just Transition[14] in South Africa where the country is transitioning to a low-carbon economy. Within the current energy context of South Africa and the current Integrated Resource Plan (IRP) as well as the just energy transition, it is expected that South Africa's energy supply mix will change in the coming years. This presents a unique opportunity for innovative decentralised water treatment technologies to enter the market as well as potential trialling sites. Given the transition to a low carbon economy, industries are looking for innovative technologies to reduce current operations and maintenance costs.

2.3. Relevant legislation

2.3.1. The National Water Act

The National Water Act (36 of 1998) (NWA) provides the legal framework for the effective and sustainable management of water resources (including surface water and groundwater) by the Department of Water and Sanitation (DWS) on behalf of the national government. The NWA gives DWS the overall responsibility and authority to manage the use of water; protect water quality; allocate water; and promote inclusive water management.

[13] https://www.news24.com/fin24/companies/industrial/astral-forks-out-r3m-for-lost-production-as-standertons-horror-continues-20210617

[14] A Just Transition secures the **future and livelihoods of workers** and their communities in the transition to a low-carbon economy. It is based on social dialogue between workers and their unions, employers, government and communities.

The NWA under Section 21 describes 11 different 'water use' activities, which include taking and storing water, reduction of stream flow, waste discharges and disposals, altering of watercourses, abstraction of underground water, recreation, and any controlled activities which detrimentally impact water resources. Section 26 regulates water use activities, design, construction, and operation of any waterworks, including the registration of respective personnel. This is particularly relevant to alternative water supply projects, including water reuse. Generally, water use must be licensed unless it is listed in Schedule I, is an existing lawful use (ELU), is permissible under a general authorisation (GA), or if the need for a water use license (WUL) is waived.

2.3.2. Categories of legal water use

The NWA classifies any lawful water use under four categories:

2.3.2.1. Schedule 1

Generally, applies to low volume (reasonable) water use with low impact activities, consistent with domestic use (non-commercial uses), recreational use, livestock watering, and for emergencies. This water use is permissible and does not require licensing or registration[15].

Residents may use groundwater on their properties for reasonable domestic use without a license[16]. However, water use entitlement under Schedule 1 does not supersede and is subject to any limitation by any other law, ordinance, **by-law** (section 3.2), or regulation set by the responsible authority in that area, e.g. municipality and provincial government.

2.3.2.2. Existing Lawful Use

Legal water use obtained under the Water Act (54 of 1956) two years prior to the commencement of NWA is considered as existing lawful use (ELU) and is subject to terms and registration under the NWA. However, such users must prove with relevant records that their water use existed before 1998, and this must be verified and validated by the DWS.

2.3.2.3. General authorisation

General Authorisations (GAs) replace the need for a license in terms of Section 21 of the NWA as outlined in a Government Notice (GN) and is site specific. There is a GN for each water use activity which sets the limits and circumstances suitable for the issuance of a GA (NWA 1998)[17].

Businesses involved in water use activities that are neither registerable under Schedule 1 nor under ELU must register the use(s) under a GA or apply for a WUL. The free registration of a GA through DWS typically takes a few weeks.

2.3.2.4. Water use license (WUL)

A WUL applies if the water use activities cannot be covered under Schedule 1, ELU, or GA in accordance to Section 21 of the NWA. A WUL application may take up to 300 working days. The government has committed to ensuring that for the following sectors, a WUL is issued within a shorter timeframe: 60 days for agriculture, 80 to 95 days for infrastructure projects from state-owned enterprises and municipalities, and 120 days for mining.

2.3.3. The National Building Regulations and Building Standards Act

In terms of design and construction, water systems must be consistent with the National Building Regulations (NBRs) under the National Building Regulations and Building Standards Act, Act 103 of 1977, which governs all building and construction work in South Africa.

At present, the NBRs do not include provisions relating to water efficiency or alternative water supply; however, a few years ago the Department of Trade, Industry and Competition (dtic) initiated the process to include these aspects. It is unclear how long this process will take.

2.3.4. National Environmental Management: Waste Act (59 of 2008)

The national norms and standards under the Act prohibit the landfill disposal of:

- liquid waste with a moisture content >40%, angle of repose <5°, free flowing when transported or at ≤60 °C (banned since 2019);
- brine or waste with a high salt content (>5%) and a leachable concentration for total dissolved solids of >100 000 mg/l (ban effective from 2021).

2.3.5. Other key national legislation and standards

Other key national laws and regulations that may be relevant to projects in the water sector are listed in Table 3.

Table 3. Other key national legislation and standards

Authority	Document	Application
Department of Water and Sanitation	Water Services Act (108 of 1997)	Relevant to the regulation of water and sanitation services provided by municipalities and water service authorities.
	Guidelines for the utilisation and disposal of wastewater sludge (2008)	Published to assist municipalities with proper management and safe disposal options, these guidelines include a number of options for managing sludge, from composting and thermal treatment, to the manufacturing of bricks. Included in the guidelines are the methodologies to reduce or remove the inherent pathogens present in the sludge.
	National Water and Sanitation Masterplan (2019)	While not an act or legislation, it is an important guiding document to inform the development of the water sector according to national priorities.
	Municipal Priority Action Plan (MPAP) Mpumalanga (2020)	Strives to identify and resolve key vulnerabilities at municipalities to enable them meeting the National Medium Term Strategic Framework (MTSF) target of 90% reliable water services.
Local Government	Municipal Systems Act (32 of 2000)	Provides for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic uplift of local communities, and ensure universal access to essential services that are affordable to all.
Department of Forestry, Fisheries and the Environment (DFFE)	National Environmental Management Act (107 of 1998)	Relevant to environmental authorisations.
	National Environmental Management: Air Quality Act (39 of 2004)	Regulates the thermal treatment of sludge.
	National Environmental Management: Integrated Coastal Management Act (24 of 2008)	Regulates the discharge of brine to the ocean.
Department of Trade, Industry and Competition (dtic)	Industrial Policy Action Plan (IPAP) 2018/19 – 2020/21	Highlights water and sanitation as a key sectoral focus area.
South African Bureau of Standards (SABS)	South African National Standard for Drinking Water (SANS 241: 2015)	Specifies the general safety and performance requirements for potable water.
	South African National Standards (SANS 30500: 2019) for non-sewered sanitation systems (NSSS)	Specifies the general safety and performance requirements for design and testing as well as sustainability considerations for NSSS.

[15] Although in some cases the local municipality may require registration.
[16] Municipalities may still require registration of boreholes or well points – see Section 3.2.3.
[17] For the list of site specific GAs, see https://cer.org.za/virtual-library/legislation/national/water/national-water-act-1998

Table 3. Other key national legislation and standards continued...

Authority	Document	Application
National Treasury	Preferential Procurement Policy Framework Act (5 of 2000)	Makes provision for the dtic to designate certain areas for local production and content. Local content designation is assessed according to the SABS through the technical specification number SATS 1286:2011 and SANS 1286:2017.
	Municipal Finance Management Act No. 56 of 2003	The MFMA aims to modernise budget, accounting and financial management practices by placing local government finances on a sustainable footing in order to maximise the capacity of municipalities to deliver services to communities. It also aims to put in place a sound financial governance framework by clarifying and separating the roles and responsibilities of the council, mayor and officials.
Department of Agriculture, Land Reform and Rural Development	Fertilisers, Farm Feeds, Seeds and Remedies Act 36 of 1947	Makes provision for registration and regulates the importation of composts, fertilisers, farm feeds, sterilising plants, and certain remedies.

Further information can be obtained from the responsible authorities indicated.

Key policy and legislative developments in the pipeline include (DWS Annual Report, 2020):

1. **Mine Water Management:** This policy seeks to balance the mining sector's economic development with the protection and sustainable use of water resources. This policy will provide a coherent and integrated South African approach by building on existing strengths; addressing barriers and seizing identified mine water management opportunities including acid mine drainage (AMD).

2. **Sustainable Hydropower Generation:** This policy aims to support the energy security master plan that pursues hydropower as part of the energy supply mix. In addition, it will also provide policy positions relating to infrastructure establishment and development of hydropower which will be owned by DWS.

3. **Integrated Water Quality Management:** This policy seeks to develop an intergovernmental water quality management approach to facilitate a coherent and integrated response to address water quality challenges. This policy will strengthen the existing integrated water quality management strategy that identified priority programmes to be implemented country-wide.

4. **National Water and Sanitation Act:** DWS conducted a legislative review which sought to consolidate the National Water Act, 1998 (NWA) and the Water Services Act, 1997 (WSA) to a single legislation named the National Water and Sanitation Act. The aim of this consolidation is to clarify the legislative framework regarding water management across the water and sanitation value chain.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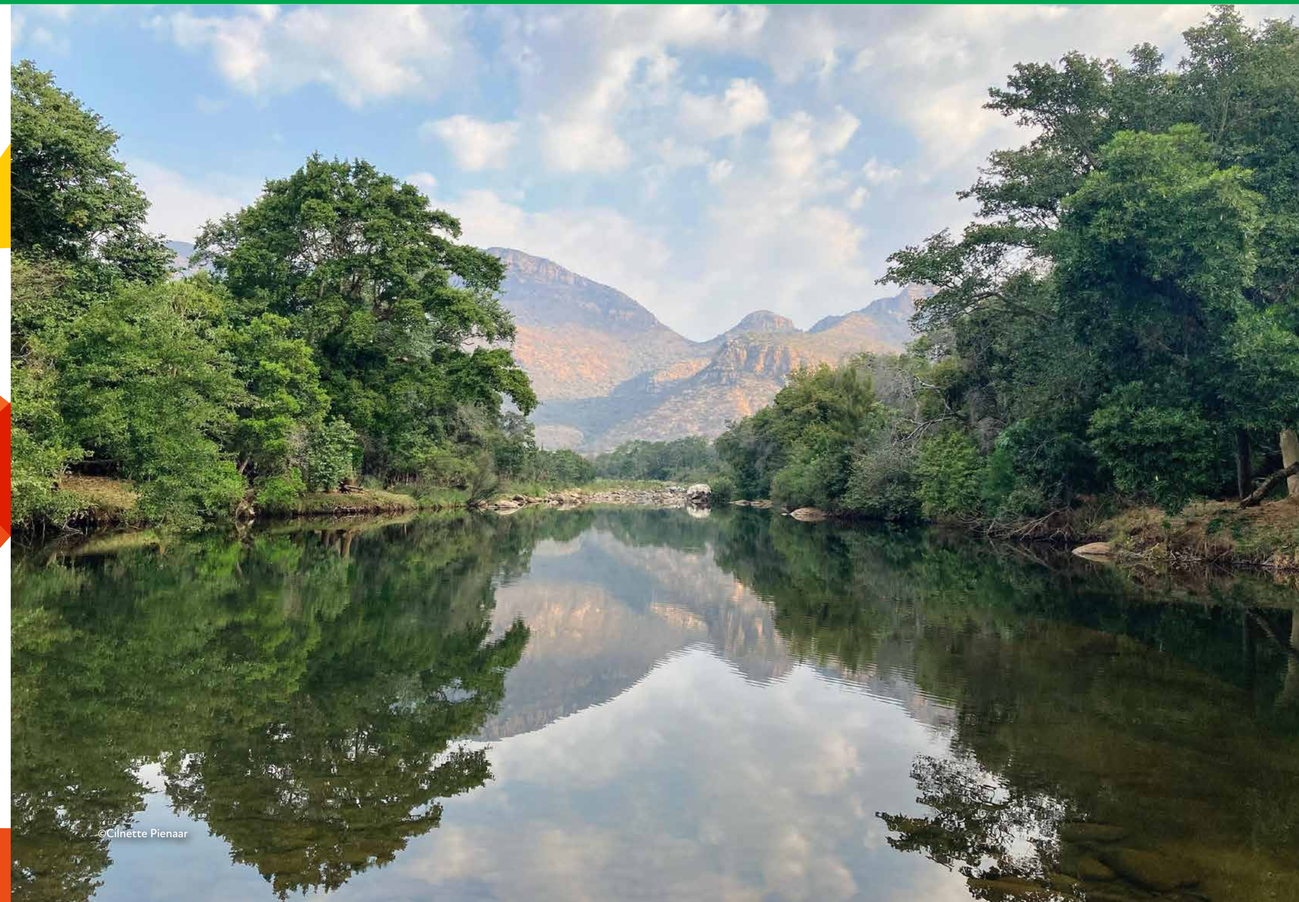
3.

EMERGING OPPORTUNITIES, DRIVERS AND BARRIERS



In this section, business and investment opportunities, together with associated drivers and barriers, are discussed in relation to the key opportunities in the largest urban water market segments in South Africa, namely the municipal and industrial sectors.

Opportunities for investment were identified in two markets: (1) municipal and (2) industrial. The main opportunities are listed in Table 4, indicating the key market segments.

Table 4: Summary of market opportunities

Market	Market Size Indicators	Main Opportunities	Key Market Segments
Municipal	South Africa's largest water market: • R54 billion in public financing • Further R36 billion needed Provincial NRW currently at 46.2% (representing R3.6 billion in lost revenue per annum).	Bulk infrastructure upgrades: • WWTW • Non-revenue water	Focussed on municipalities having the highest efficiencies in terms of capital spending, asset renewal and spending on repairs and maintenance.
Industrial	• In 2016 it was estimated that water use in coal mining totalled to 53.8 million cubic meters per annum, with a large portion ending up as wastewater. • Eskom spends R280 million per annum on water treatment (2017).	• Decentralised water treatment works • Brine management solutions • Alternative sanitation	• Coal mines • Power generation sector

3.1.

Municipal Market

3.1.1. Market overview

Globally, utilities dominate the water and sanitation market which is sized at US$580 billion (67%) in 2016 followed by the industrial sector at 15% or US$130 billion (TIPS 2018). Table 1 shows that the total planned public sector funding for water and sanitation in South Africa is ~R54 billion. This represents a considerable opportunity for investors and technology providers to supply services and technologies to the municipal market. In addition to the R54 billion set out above, a further ~R36 billion is required by DWS in terms of capital requirements. This funding shortfall represents an opportunity for investors to provide innovative project financing.

3.1.2. Opportunities

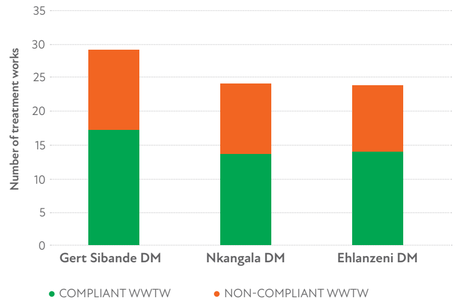
Significant investments are needed in the restoration of existing infrastructure as well for providing additional capacity for both water resources infrastructure (for which national government is responsible) and the water services infrastructure (for which municipalities are responsible). The capacity of the sector to support the financing of these investments is weak, as a result of low water tariffs, high levels of non-revenue water and weak revenue collection (DPWI 2021).

As such two main opportunities were identified for investment in the **municipal** water market: **bulk infrastructure upgrades of WWTW** as well as reducing **non-revenue water**. These are also two key opportunities identified in the DWS **Municipal Priority Action Plan (MPAP)** where WSA's such Muskaligwa, Lekwa, Govan Mbeki, Emalahleni, Steve Tshwete, Themibisile Hani, Thaba Chweu and City of Mbombela are identified as priority municipalities by the inter-ministerial task team (IMTT) to address key vulnerabilities (Balzer 2020). Key projects currently underway in the province relate to bulk water supply in terms of upgrading treatment works as well as bulk pipeline infrastructure.

3.1.2.1. Bulk Infrastructure Upgrades: WWTW

The Mpumalanga province consists of 77 municipal owned wastewater treatment works (WWTW). The province is also serviced by 14 WWTW owned by the national Department of Public Works resulting in 91 treatment works being monitored by DWS. Of the 77 WWTW owned by the municipal sector, 34 are deemed non-compliant as presented in Figure 13 (Balzer 2020). Due to the increase in water demand as well as population growth and urbanisation within the province, the majority of the WWTW operate well above the designed capacity (Figure 14) resulting in infrastructure failure and non compliant effluent discharge (Green Drop 2014). Non-compliant effluent discharge often leads to downstream contaminantion of surface water impacting other stakeholders in the water value chain.

Figure 14: Compliance of WWTW per district municipality (Green Drop Report 2014)



Some of the key reasons for WWTW being categorised as non compliant include failing infrastructure, lack of maintenance and lack of skilled operating personnel on site.

As stated in Section 2.2.1 municipalities heavily depend on grant funding for operations and maintenance. WSA currently benefits from two conditional grant structures from DWS, namely the **Regional Bulk Infrastructure Grant (RBIG)** and the **Water Service Infrastructure Grant (WSIG)**. The RBIG focuses on the development of the water services infrastructure that are considered bulk in nature such as WWTW. The WSIG focuses on helping municipalities with backlog reductions in terms of water and sanitation provision. The definition of the municipal grant types and schedules are tabulated in Table 5.

Figure 15: Design and operating capacities of WWTW at the 17 local municipalities in Mpumalanga (Green Drop Report 2014)

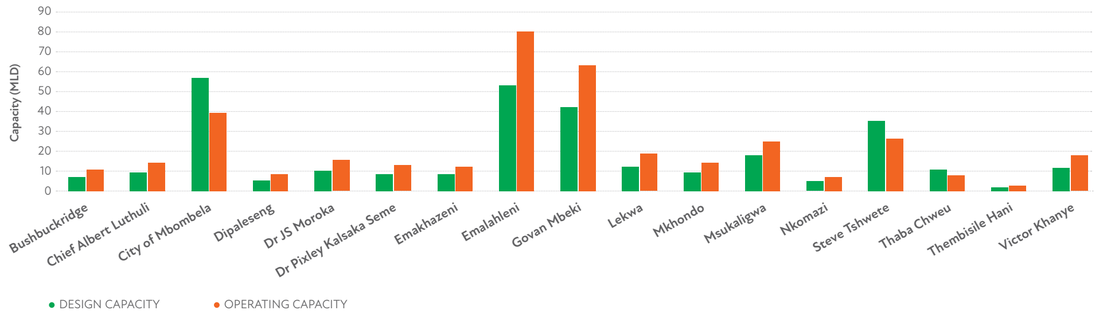


Table 5: Grant types and Division of Revenue Act (DORA) scheduling definitions

Grant Types	Grant Schedule	Explanation
Regional Bulk Infrastructure Grant (RBIG) and Water Services Infrastructure Grant (WSIG)	Schedule 5B – Direct Grant	In this schedule disbursement of funds to municipalities is done or transferred in advance (pre-work payment) to municipalities. Municipalities based on the transfer made execute the work aligned with the conditions of the funds transferred and report to the Department as the transferring institution on the performance of the funds (expenditure incurred including physical progress made) within a regulated period and intervals. Municipalities classified on direct payment are deemed to be institutions with requisite capacity to implement water services infrastructure projects of bulk nature as well as ability to conform fully with the regulated provisions and condition as per the framework of the grant and also the Division of Revenue Act (DORA).
	Schedule 6B – Indirect Grant	In this schedule, DWS implement the projects or appoint the implementing agent either in the form of water board or other municipality on behalf of the concerned municipalities for the benefit of the concerned municipality. Where the latter takes effect, the concerned implementing agent executes the work and based on the work done invoice the Department for the reimbursement or payment of this work, The payment is done post verification by DWS on work claimed.

Financial support available to municipalities in Mpumalanga for the financial year 2020/2021 is tabulated in Table 6. **DWS reported a national RBIG funding shortfall of R51.5 billion in 2019.**

Table 6: Total grant allocations for the 2020/2021 financial year for Mpumalanga local municipalities

Grant	DORA Schedule	Allocation (R'000)
RBIG	Schedule 5B	R 478 407
	Schedule 6B	R 275 366
WSIG	Schedule 5B	R 402 375
	Schedule 6B	R 50 650
Total		**R 1 206 798**

Additional support for municipalities to address some of the challenges highlighted are:

- DWS assists municiplaities with capacity shortfalls via the Municipal Infrastructure Support Agent (MISA) and the DWS Construction Unit.
- An Integrated Plan is developed with municipalities and DWS to address the implementation of unplanned projects due to a lack of maintenance.
- Funding shortfalls are addressed via the submission of an infrastructure bid funding request on unfunded and critical projects.
- DWS's Green Drop Certification Programme has been reinstated to reward compliant municipalities and incentivise non-compliant municipalities.

An associated opportunity that could potentially arise when WWTW is upgraded and fully functional is **sludge beneficiation**. The costs associated with managing wastewater sludge can represent 40 to 60% of total WWTW plant operating costs, depending on the size of the plant and initial wastewater characteristics. Despite the potential for energy and resource recovery from wastewater sludge through, for example, biogas generation, the residual sludge (digestate) still requires disposal. The opportunity to utilise this biogas by-product to offset the energy requirements of the WWTWs requires the implementation of combined heat and power (CHP) technology, and in many cases requires refurbishment of the existing anaerobic digesters.

3.1.2.2. Non-Revenue Water

Non-revenue water (NRW) is the volume of water supplied by a water services provider (water utility) for which it receives no income due to various factors, including water losses, metering errors, billing errors, theft, and unbilled authorised consumption. South African municipalities cumulatively use around 5 billion kl per year, of which 39.3% is NRW (NW&SMP 2019), representing an estimated R44 billion in lost revenue each year[18]. **Table 7** shows the provincial NRW and water use per capita.

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[18] Based on an average 2020/21 metro tariff of R22.39/kl

Table 7: Overview of non-revenue water in South African provinces (DWS 2019a)

Province	Population	System Input Volume (million m³/annum) [19]	% NRW	NRW (million m³/annum)	Per capita consumption (l/c/d)
Northern Cape (NC)	1 263 875	85.80	43.5	37.32	186
Free State (FS)	2 887 465	220.27	42.3	93.17	209
Mpumalanga (MP)	4 592 187	343.61	46.2	158.75	205
North West (NW)	4 027 160	349.84	41.2	144.13	238
Limpopo (LP)	5 982 584	397.42	50.3	199.90	182
Eastern Cape (EC)	6 712 276	490.00	46.3	226.87	200
Western Cape (WC)	6 844 272	502.13	20.2	101.43	201
KwaZulu-Natal (KZN)	11 289 086	927.12	45.0	417.20	225
Gauteng (GP)	11 176 115	1 689.48	34.7	586.25	305
National	58 775 020	4 998.52	39.3	1 965.04	233

Available data at the DWS dashboard – year 2020 – on non-revenue water is limited to these Mpumalanga local municipalities: **Emalahleni LM 47%, Govan Mbeki LM 21%, Mbombela LM 42% and Steve Tshwete LM 31%**.

Water conservation and water demand management (WC/WDM) interventions can reduce NRW significantly. **Table 8** presents an extensive range of options for WC/WDM interventions, while the national water and sanitation master plan (NW&SMP) places emphasis on the interventions in bold in **Table 8**, namely, programmes to reduce water leakage by proactively looking for and fixing leaks in distribution networks, and improving the efficiency of water use by domestic and commercial water users. These interventions are also low-hanging fruit in addressing NRW.

[19] Based on population (2019 Stats SA) and % NRW (NW&SMP 2019)

Table 8: Options to reduce non-revenue water

Category	Water conservation and demand management (WC/WDM) intervention
Monitoring and data	Smart or remote meters, asset management, database polishing, water balance analysis, real-time system monitoring, improved billing and revenue collection systems
Physical loss reduction	Leak detection, early warning major leak prevention, **active leak repair systems**, pressure reduction schemes, night flow pressure reduction, water efficient devices, removal of unlawful connections
Educating users	Non-billed authorised consumption reduction, customer leak reporting system, water restrictions, **efficient consumption**, informative billing, education and awareness programmes

The savings brought about by these interventions enable various benefits, including increased revenue, deferred capital expenditure, lower energy costs, and reduced bulk water spending. Customer service is also improved through fewer service interruptions, more continuous supply, higher pressures, and cleaner water (PPIAF & WBG 2016).

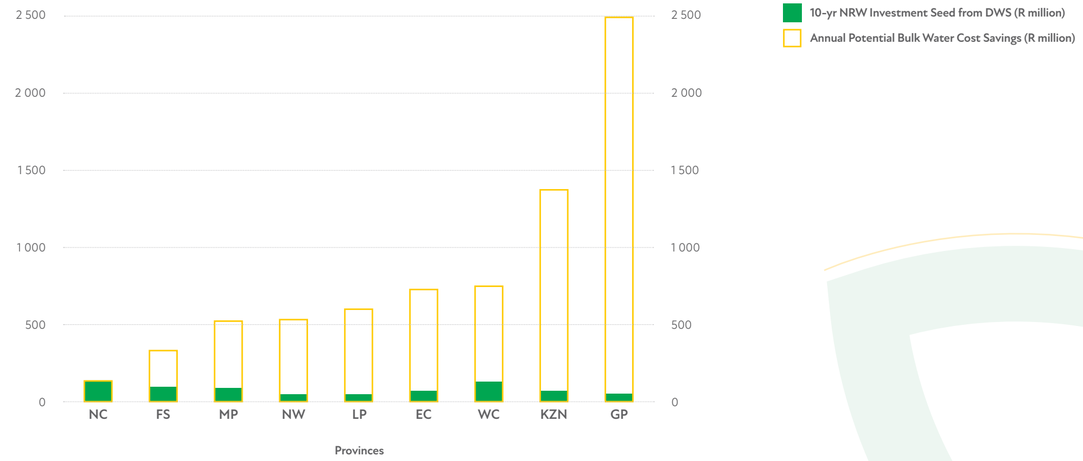
The NW&SMP targets an NRW of 26% (a 15% reduction from the current 39.3% average) nationally by 2030. It has committed a total investment of R 676 million over ten years, distributed equally between WSAs, to assist with achieving this target but further private and municipal investment in NRW projects is needed. The R676 million consists of a R3 million up-front component and a R1 million maintenance follow-up component for each of the 169 WSAs.

Figure 15 indicates the provincial distribution of this seed investment, which is linked to the number of WSAs per province, and the associated potential bulk water cost savings attainable by achieving this target. There are opportunities for private sector participation in NRW reduction programmes in municipalities.

This will include PPP (Public – Private – Partnerships) and PBC (Performance Based Contracts) amongst other financial models which will be subject to municipal procurement. The national cost savings potential from reducing NRW by 15% is estimated at R7.4 billion per year (GreenCape analysis 2021[20]). The market lies predominantly in the metros and the large cities, which represent 84% of this national savings potential (DWS & SWPN 2015).

[20] Based on an average 2020/21 water board bulk tariff of R9.80/kl. Assumed NRW reduction achieved through water loss reduction.

Figure 16: Provincial distribution of DWS 10-year investment seed (NW&SMP 2019) and the associated annual potential bulk water cost savings (GreenCape analysis 2021)



A fundamental part of an NRW reduction project is to confirm the water balance of the distribution system(s), or of sub-sectors of the system, through flow and/or pressure monitoring. To support this fundamental requirement of monitoring, the NW&SMP has targeted a revitalisation of the No Drop Certification programme, with monthly reporting required from municipalities.

To kick-start this regulatory compliance driver for NRW reduction, the NW&SMP estimates a once-off investment in the monitoring system of R0.2 million per municipality, totalling R29 million nationally, will be required.

The following support plans for the NRW market are available South Africa:

- DWS, CoGTA and DBSA are developing a national NRW reduction implementation support programme to ensure a standardised and informed approach across municipalities[21]. The programme is currently at pre-feasibility stage, but once approved, it is estimated at R35 billion to R50 billion for potential loans and services (National Treasury 2020).

[21] https://www.engineeringnews.co.za/article/national-non-revenue-water-programme-in-development-2020-03-13/rep_id:4136

3.1.3. Drivers

The major driver for bulk infrastructure upgrades and non-revenue water is the need for water conservation and demand management. These projects are particularly triggered by:

- Key provincial development plans driving these opportunities are: (1) Mpumalanga Vision 2030 Strategic Implementation Framework, (2) Mpumalanga Economic Growth and Development Path, (3) Mpumalanga Spatial Development Framework.
- Regulatory compliance (DWS and reinstatement of the Green Drop Programme and the No Drop Programme will likely also be reinstated);
- Revenue enhancement (increasing the income of municipalities)
- Increased project preparation support as per the Economic Reconstruction and Recovery Plan (ERRP).
- Lost revenue of R3.6 billion per annum due to NRW in Mpumalanga.

3.1.4. Barriers

While there are opportunities for private sector investment in municipal-scale projects, there are also barriers, as set out below.

Access to funding: Municipal-scale projects are often capital intensive, and access to funding can be a major constraint, particularly for the smaller, less financially stable municipalities that do not have the capacity (or the risk is considered to be high) to develop bankable project pipelines to raise funds off-budget. This can lead to shortfalls in funding available for water services infrastructure.

Capacity constraints: In Mpumalanga 60% of WSAs stated that WWTWs are not operated by the appropriate number of staff and that 59% of the WWTWs are not operated by staff with the correct skills/qualifications and experience (MuSSA 2019). These capacity constraints limit the ability of municipalities to confidently operate existing infrastructure or pilot innovative water technologies.

Municipal procurement processes: These procurement processes can be lengthy and tenders are often poorly specified. In addition, municipalities are hesitant to enter into Public Private Partnerships (PPP), which are relatively uncommon in the South African water sector and can be complex and difficult to arrange. Procurement processes also hinder municipalities' ability to trial innovative technologies.

While NRW projects represent a significant opportunity for investors, there exists a number of challenges to implementing such projects such as:

- a lack of political will to prioritise these projects;
- operation and maintenance budgets are often more readily cut than capital budgets, and
- NRW data is not reliably up to date or readily accessible.

3.2. Industrial Market in Mpumalanga

3.2.1. Market overview

Coal mining within the province is mainly concentrated in the local municipalities of Emalahleni, Steve Tshwete and Govan Mbeki (Strambo 2019). Mining companies often offer services that are normally provided by local governments such as water and sanitation, as well as housing, to their employees. Additionally they fund water and sanitation services as part of their corporate social investment. South Africa relies heavily on coal to generate ~92% of its electricity and to produce roughly 20% of its liquid fuels (Department of Energy 2015; Strambo 2019). This results in Eskom and the chemical firm Sasol using 85% of the coal in the local market, by volume.

Coal is also one of South Africa's largest exports by value, accounting for R 61 billion (Minerals Council 2018). In 2016, it was estimated that **water use in coal mining** totalled to **53.8 million cubic meters** per annum, a large portion ending up as wastewater. The estimated water use in **coal-power generation** is **~3 184 L per MWh**.

Decentralised treatment works are identified as the central investment opportunity within the Mpumalanga industrial water sector. Sub-sets of this opportunity include **brine and wastewater management**.

3.2.2. Opportunities

3.2.2.1. Decentralised water treatment works

Decentralised water treatment technologies is a key area of development within the industrial water sector. Technology options that are easily deployable and that can be used to retrofit current treatment works are preferred to greenfield capital projects as this is considered to have a lower cost impact and is less onerous to implement.

As indicated, the industrial sector is mainly dominated by coal mining and power generation. It is estimated that a total of 431 L of water is used to produce one ton (volumetric) of coal (CER 2018). This includes water used for extraction, dust control and evaporation, but excludes water for coal washing. **Table 9** tabulates the water required to generate electricity. It is also highlighted in **Table 9** that the national power utility, Eskom, spends R280 million per annum on water treatment costs. These figures highlight the magntitude of opportunity within the industrial water sector in the Mpumalanga province.

Table 9: Water volumes, water costs and treatment costs for the 2017/2018 financial year at Eskom power stations located in the Mpumalanga Province (Eskom 2017)

Power Station	Generation Capacity (MW)	Water Volumes (Million m^3)	Water Cost (R million)	Water Cost (R/m^3)	Water Treatment Costs (R million)
Kriel	3 000	34.2	305	8.9	39
Kendal	4 116	5.7	72	12.6	38
Tutuka	3 654	34.2	205	6	86
Duvha	3 600	22	79	3.6	13
Matla	3 600	37.5	253	6.7	35
Arnot	2 352	25.5	134	5.3	40
Majuba	4 110	22.1	72	3.3	35
Kusile	4 800	2.055	40	19.5	2
Camden*	1 510	17.9	116	6.5	7
Grootvlei*	1 200	9	29	3.2	24
Komati*	940	15.1	101	6.7	19
Hendrina*	2 000	19 .5	122	6.2	17
Total					**280**

*These power stations were selected to be repurposed but are currently still operational.

3.2.2.2. Brine Management

Two sub-sets of opportunities identified within the industrial water sector in Mpumalanga includes brine management and non-sewered sanitation solutions. These opportunities are especially driven by increased water demand within the province. Currently, brine ponds are predominatly used for disposal, however these pose a significant environmental risk and are very costly. Legislation is also tightening around the approval of such ponds thereby forcing mines to investigate innovative disposal or reuse methods. The (saline) liquid ban to landfills also took effect this year (2021), further driving the opportunity for innovative technologies to enter the market and the identification of fit-for-purpose reuse. Brine management is however considered a very complex issue with bankable technologies being scarce.

3.2.2.3. Non-sewered sanitation solutions

Alternative sanitation solutions were also identified as a sub-set of wastewater management. As indicated earlier, mines often take on the responsibilities of local governments to provide water and sanitation for local mining communities. However, in recent years these communities have grown to the extent that the wastewater treatment works are operating far beyond their capacity.

Again, mines in particular, are not looking to invest in capital projects but rather to consider moving to alternative non-sewered sanitation solutions.

3.2.3. Drivers

The major driver to decentralised water treatment works are **supply risks** due to a risk of insufficient supply as well as deteriorating water quality. This is mainly due to the pressure placed on the Vaal River Catchment due to the Lesotho Highlands Project being delayed by 8 years.

Additional drivers include:

High O&M costs for current treatment technologies: Current treatment works have high operations and maintenance costs and companies are always looking for measures to implement that could potentially reduce these costs and decrease the risk of theft and vandalism.

Environmetal, Social and Governance (ESG) Reporting and Targets: Commitments by large industrial businesses (particularly those with large international parent companies) often require them to report on their water consumption against set targets, and submit their plans for investment in water efficient technologies.

Improved reliability: Successful deployment of wastewater treatment plants has created a low-risk perception for companies considering these technologies. Additionally, technology providers are now offering to take responsibility for restoring the implemented technology should it malfunction, which further reduces the risk of implementation.

3.2.4. Barriers

Increased operational complexity: Advanced water projects often increase the operational complexity to beyond the operations and management (O&M) skills available within industrial companies (and this is more so in small to medium sized operations). This can lead to operational risks, and a reluctance to proceed with more complex water projects. Skills development or upskilling of existing staff is required, which adds to the cost of the project. There is an opportunity for innovative procurement models that place the operational responsibilities on the technology and service providers.

Licensing and authorising: Obtaining licenses and authorisations needed for water-related projects can be a complex and lengthy process. DWS has announced in 2021 to reduce the WUL application (WULA) timeframe from 300 days to 90 days. The implication is that projects generally now have to advance to feasibility stage rather than pre-feasbility to ensure that WULA comply with the level of detailed required.

4.

FUNDING AND INCENTIVES

South Africa ranks as one of the top 15 nations in the world in terms of driving the green growth agenda (ahead of Australia, Singapore, and Finland). This drive is on the back of a range of funding solutions and tax incentives available to green technology manufacturers and service companies, as well as those who use or procure such goods and services.

The South African Climate Finance Landscape looks at detailed project-level data, understanding in detail the source, disbursement, instrument and use. The insights can support public and private role-players with information to shape sectoral strategies and selected policies and improve coherence and coordination between public and private level spending in the sectors. The South African Climate Finance Landscape has tracked R62.2 billion in annual climate finance invested in SA. Find out more here.

General database web page
The GreenCape Finance Desk hosts a web page with a number of Green Finance resources that cover funding and incentives available to companies operating in the green economy.
A few of the available database are highlighted below.

The Green Finance Desk (GFD) primarily acts as a facilitator in the financing of green projects and green business. The GFD works across all sector desks at GreenCape. For more support please contact jack@greencape.co.za

Green Finance Database

GreenCape maintains a database of funding sources and incentives that may be relevant to green economy investors. The database contains information on more than 150 funding opportunities, including an overview of the opportunity and relevant contact details and links. It is ideal for any entity seeking a broad range of funding solutions and financial incentives, with South African institutions being the main source of opportunities. The database is available to view and download online[22].

Government funding and incentives database

An updated document focused on South African government funding and incentives is available to view and download online[23]. These incentives cover local manufacturing, critical infrastructure grants, small enterprise development and a diverse set of sector specific incentives (i.e. Aquaculture Development and Enhancement Programme).

Finfind database

Finfind[24] is an innovative online finance solution that brings together SMME finance providers and finance seekers. With a focus on finance readiness, Finfind has more than 200 lenders and over 350 loan products available to SMEs. The database is ideal for South African SMMEs who are seeking funding and/or business advisory services, and those who want to improve their understanding of finance.

AlliedCrowds database

AlliedCrowds[25] is the first complete aggregator and directory of alternative finance providers in the developing world. Sign-up is free and allows users to access a global database where one can filter for sector (including greentech, agriculture and social impact), type of capital (equity, lending, grant), and type of funding (crowdfunding, angel investing, venture capital, impact investing). In addition:

- Themed databases around the Sustainable Development Goals (SDGs) and the World Green Economy Organisation (WGEO) are available.
- Reports, including a number specifically about African funding sources, can also be downloaded for free.
- Businesses / organisations can also contact Allied Crowds to create a customised funding database. This resource is ideal for any entity seeking a broad range of financial solutions on a global scale.

[22] https://www.green-cape.co.za/content/focusarea/green-finance-databases
[23] https://www.greencape.co.za/assets/Uploads/Government-Funding-and-Incentive-Booklet.pdf
[24] https://www.finfindeasy.co.za/
[25] https://alliedcrowds.com/

5.

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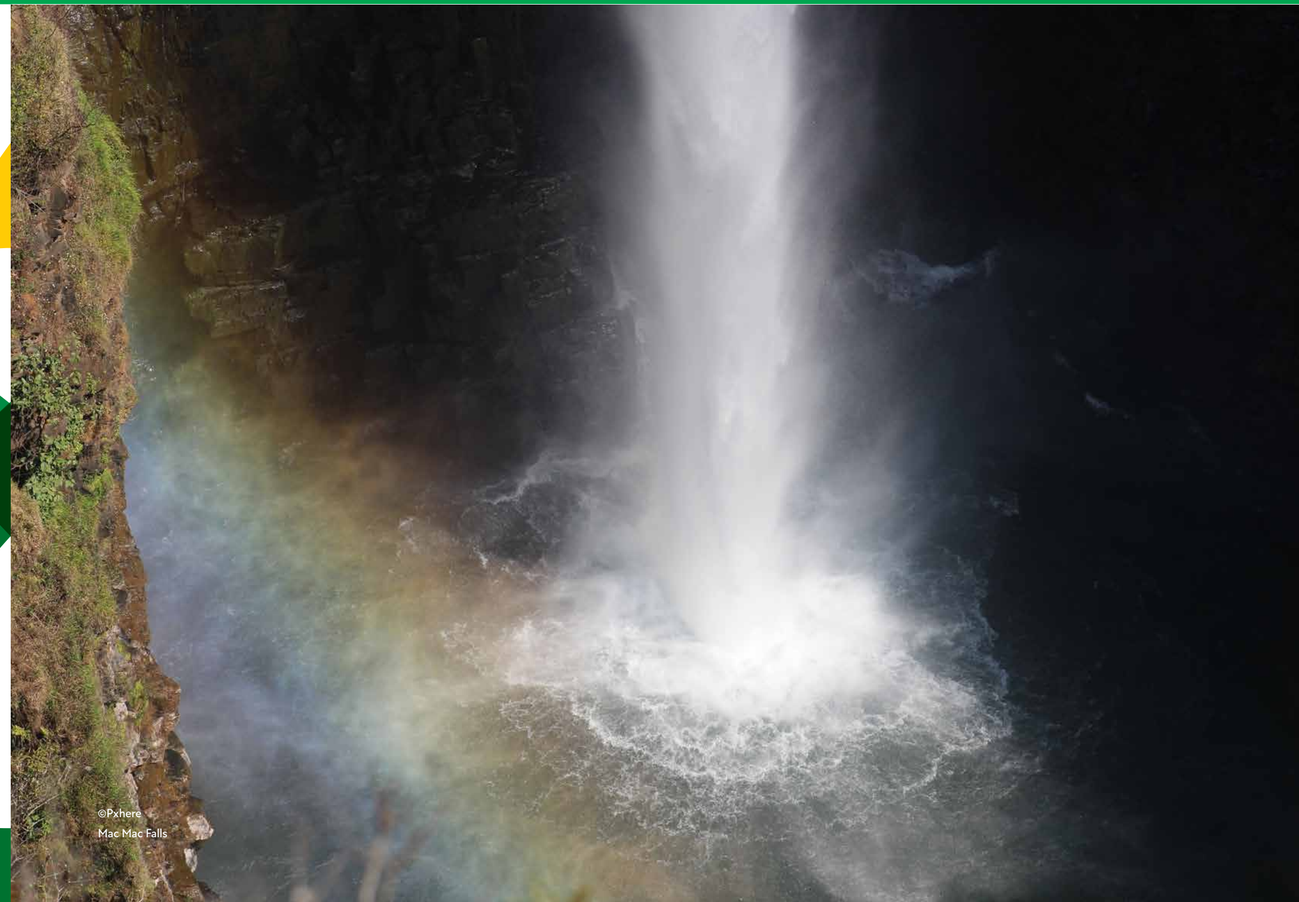

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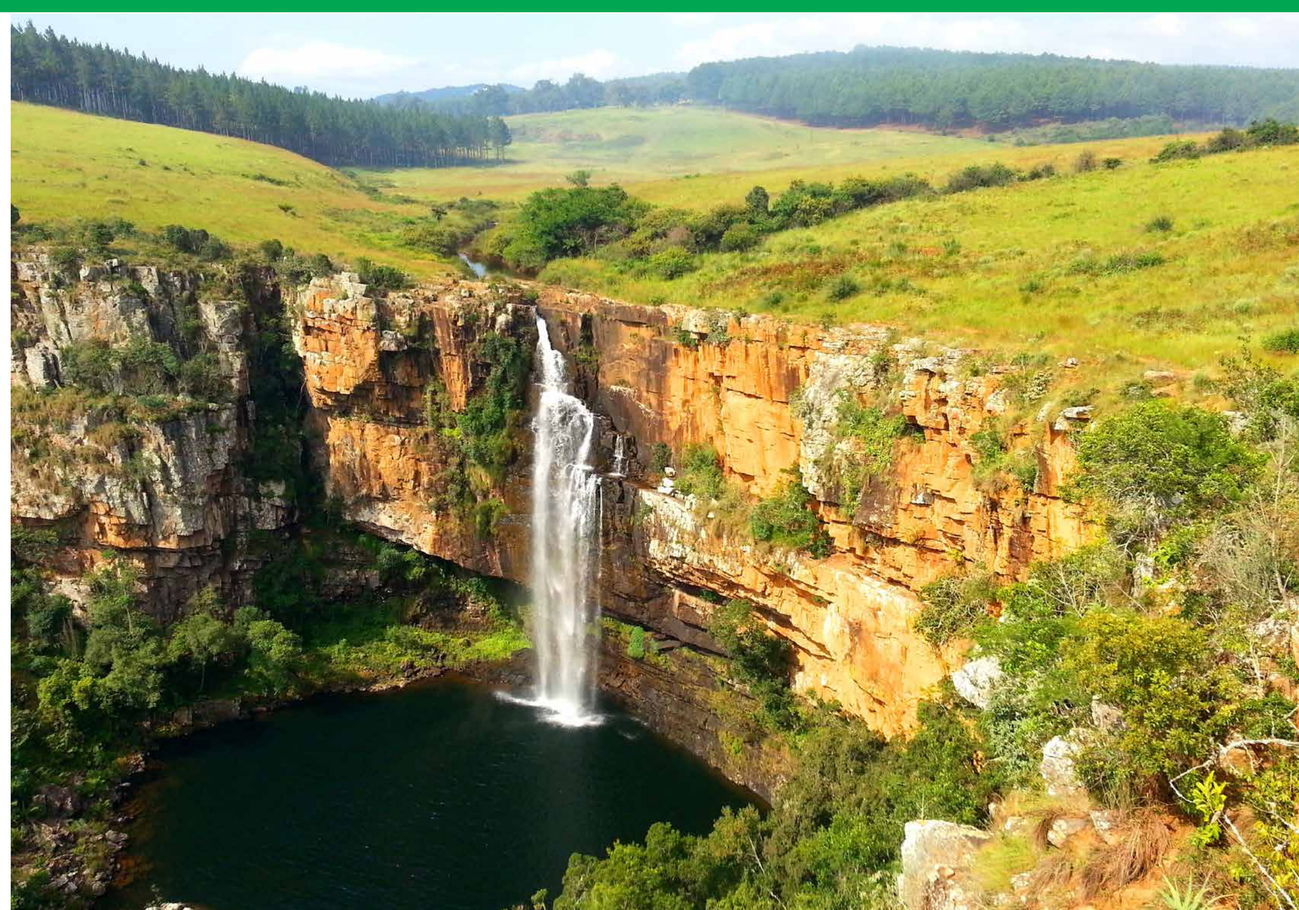

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