



FREE STATE REGION

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INTRODUCTION

The Free State Region incorporates the Balkfontein Water Treatment Works, which was constructed during the 1950s to supply the initial service area of the former Goldfields Water (currently known as Sedibeng Water). Being Sedibeng Water's longest operating and largest plant, the operational practices of this plant have matured over time and serve as a functional model for all the plants owned and operated by this Water Board.

The Free State Region supplies bulk potable water to:

- The Matjhabeng Local Municipality (Free State Province);
- The Nala Local Municipality (Free State Province);
- The Maquassi Hills Local Municipality (North West Province); and
- Various mines in the distribution area.

During the 2018/2019 financial year, the Free State Region continued to provide operations and maintenance services at the water and wastewater treatment works of Bloemhof and Christiana in the

Lekwa-Teemane Local Municipality in the North West Province. Since Sedibeng Water took over these water and wastewater treatment works, the plants have been operating optimally and produce potable water that meets high quality standards.

WATER SOURCES

Water is being abstracted from the Vaal River, Sand River Canal and boreholes. All the boreholes are located in the North West Province and supplement the water supply to the Maquassi Hills Local Municipality. Raw water treated at the Balkfontein Water Treatment Plant is drawn from the Vaal River, and that of the Virginia Water Treatment Plant is abstracted from the Sand River Canal (which is fed from the Allemanskraal Dam). The raw water from the Allemanskraal Dam is subject to a quota, and the amount of water to be used is dependent on the amount of water available in the dam, which is mostly influenced by rainfall. Supply and demand related to these water sources are summarised in Table 1.

Table 1: Supply and Demand: Water Sources in the Free State Region

Source	Plant	Design Capacity (Mℓ per day)	Current Demand	Municipal Area Served
Vaal River	Balkfontein	360	164	Matjhabeng LM Nala LM Maquassi Hills LM
Allemanskraal Dam / Sand River Canal	Virginia	120	66	Matjhabeng LM
Boreholes			2	Maquassi Hills LM

Raw water purchases and water volumes produced (sold) for the 2018/2019 financial year, are reflected in the ensuing two tables.

Table 2: Raw Water Purchases

Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	85,347,246	7,922,727	10.23
2018/2019	91,802,527	6,455,281	7.56

Table 3: Volume Produced (Sold)

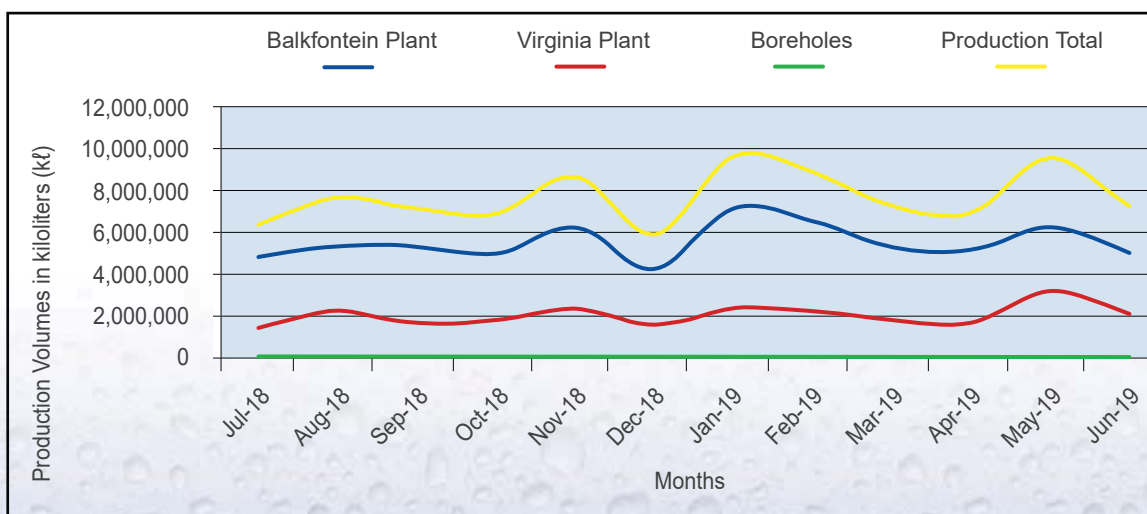
Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	76,235,439	2,078,146	2.80
2018/2019	78,400,398	2,164,959	2.84

During the year under review, raw water purchases and water sales volumes increased by 12.25% and 2.84%, respectively. These increases are attributed to the fact that raw water restrictions were lifted, population growth in the area of supply and the

fact that the Masilonyana Local Municipality was assisted with water from time-to-time.

Graph 1 reflects monthly production trends in the Region for the financial year under review.

Graph 1: Free State Region Monthly Production Trends



POTABLE WATER SUPPLY: LEKWA-TEEMANE LOCAL MUNICIPALITY

The Free State Region continues to provide operations and maintenance services at the Bloemhof and Christiana Water Treatment Works in the municipal area of the Lekwa-Teemane Local Municipality.

Bloemhof Water Treatment Works

Raw water abstraction and volumes produced at the Bloemhof Water Treatment Works are depicted in Tables 4 and 5.

Table 4: Bloemhof Water Treatment Works: Raw Water Abstraction

Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	3,969,240	340,640	9.39
2018/2019	4,241,230	271,990	6.85

Table 5: Bloemhof Water Treatment Works: Volume Produced (Sold)

Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	3,632,810	361,860	11.06
2018/2019	3,699,790	66,980	1.84

Raw water abstraction increased by 6.85% and water sold by 1.84%. The increase in water abstracted compared to the lesser increase in water sold, can be attributed to more water losses at the water treatment plant.

Christiana Water Treatment Works

Raw water abstraction and volume produced at the Christiana Water Treatment Works are depicted in Tables 6 and 7.

Table 6: Christiana Water Treatment Works: Raw Water Abstraction

Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	2,547,110	1,437,180	129.48
2018/2019	2,343,390	-203,720	-7.99

Table 7: Christiana Water Treatment Works - Volume Produced (Sold)

Year	Volume (kℓ)	Increase in Demand (kℓ)	Increase (%)
2017/2018	ND*	ND*	ND*
2018/2019	2,150,290	ND*	ND*

* Not determined

The final meter unit reading to determine volumes of water produced, did not register correctly at the Christiana Plant, due to an upgrading project at the Utlwanang Pump Station. This project is controlled by the Dr. Ruth Segomotsi Mompoti

District Municipality. The project entails new pumps and pipework, as well as changes to the building infrastructure, which interfered with the correct measurement of the final water produced.

Drought Relief

There were no drought interventions provided by the Free State Region in the 2018/19 financial year.

Emergency Supply of Water to the Masilonyana and Mafube Local Municipalities

Sedibeng Water supplied potable water to Winburg, Theunissen and Brandfort with water tankers. This was done from time-to-time on request by the municipality. The Mafube Local Municipality was likewise supplied with potable water using water tankers since 6 May 2017. Such tankering still continues to date.

POTABLE WATER QUALITY

Potable Water Quality at the Balkfontein and Virginia Water Treatment Plants

Water quality statistics for the year under review are summarised in Tables 8.1 and 8.2. Final water from both the Balkfontein and Virginia Water Treatment Works complied with SANS 241:2015 standards for drinking water with regards to microbiological, physical and organoleptic, as well as chemical parameters. Heavy rains in the catchment of the Vals River resulted in the deterioration of raw water quality due to high turbidity and algal blooms. Blue-green algal blooms were experienced in the Vaal River during the year under review.

Table 8.1: Water Quality Results - Balkfontein (Final Water)

Determinand	Unit	Specification	Compliance SANS 241:2015
Physical and Organoleptic Requirements			
pH	pH	5.0 – 9.5	>99.9
Turbidity	NTU	<1.0	98.71
Microbiology Safety Requirements			
<i>E. coli</i>	Count/100mℓ	-	99.71
Operational Water Quality Alert Levels			
Total Coliforms	Count/100mℓ	10	99.42
Average Free Chlorine	mg/ℓ	2.42	

Table 8.2: Water Quality Results - Virginia (Final Water)

Determinand	Unit	Specification	Compliance SANS 241:2015
Physical and Organoleptic Requirements			
pH	pH	5.0 – 9.5	>99.9
Turbidity	NTU	<1.0	>99.9
Microbiology Safety Requirements			
<i>E. coli</i>	Count/100mℓ	-	>99.9
Operational Water Quality Alert Levels			
Total Coliforms	Count/100mℓ	10	>99.9
Average Free Chlorine	mg/ℓ	1.84	

Water quality compliance for the different supply systems in the distribution network in the Free State Region is reflected in Table 8.3.

Table 8.3: Water Quality Results (Supply Systems)

Supply Systems in the Free State Region	Compliance Levels (%) - SANS 241:2015					
	Microbial: Acute Health (97% min)	Chemical: Acute Health (95% min)	Chemical: Chronic Health (95% min)	Chemical: Non-health: Aesthetic (95% min)	Operational: (95% min)	Disinfectant: (95% min)
MATJHABENG LM						
Welkom	99.3	99.9	99.5	99.9	99.6	98.3
Allanridge	99.2	99.9	99.2	99.9	99.5	96.3
Odendaalsrus	99.2	99.9	99.2	99.9	99.5	98.4
Hennenman	99.2	99.9	99.3	99.9	99.4	98.4
Virginia	99.0	99.9	99.2	99.9	99.4	91.7
Ventersburg	99.1	99.9	98.9	99.8	99.1	98.4
MAQUASSI HILLS LM						
Leeudoringstad	99.7	99.9	99.3	99.9	99.6	97.2
Makwassie	99.7	99.9	99.3	99.80	99.5	98.9
Wolmaransstad	99.7	99.9	99.3	99.9	99.7	98.4
NALA LM						
Wesselsbron	99.5	99.9	99.5	99.9	99.4	98.1
Bothaville	99.7	99.9	99.3	99.9	99.5	96.7

Potable Water Quality in the Lekwa-Teemane Local Municipality

Water quality statistics at the Bloemhof and Christiana Water Treatment Works in the Lekwa-Teemane Local Municipality for the 2018/2019 financial year, are summarised in Tables 9.1 and 9.2. Final water from the Bloemhof Water Treatment

Plant complied with SANS 241:2015 standards for drinking water with regards to microbiological, physical and organoleptic, as well as chemical parameters. The Christiana Plant did not always comply with operational limits with regards to turbidity, due to the fact that the demand is much higher than the operational capacity of the plant.

Table 9.1: Water Quality Results - Bloemhof (Final Water)

Determinand	Unit	Specification	Compliance SANS 241:2015
Physical and Organoleptic Requirements			
pH	pH	5.0 – 9.5	>99.9
Turbidity	NTU	< 1.0	92.2
Microbiology Safety Requirements			
<i>E. coli</i>	Count/100m ^l	-	98.0
Operational Water Quality Alert Levels			
Total Coliforms	Count/100 m ^l	10	98.0
Average Free Chlorine	mg/ℓ	1.77	

Table 9.2: Water Quality Results - Christiana (Final Water)

Determinand	Unit	Specification	Compliance SANS 241:2015
Physical and Organoleptic Requirements			
pH	pH	5.0 – 9.5	>99.9
Turbidity	NTU	< 1.0 (Operational)	84.3
		<5 (Aesthetic)	>99.9
Microbiology Safety Requirements			
<i>E. coli</i>	Count/100mℓ	-	>99.9
Operational Water Quality Alert Levels			
Total Coliforms	Count/100mℓ	10	>99.9
Average Free Chlorine	mg/ℓ	1.55	

WASTEWATER EFFLUENT QUALITY

Balkfontein Wastewater Treatment Plant

In terms of the Department of Water and Sanitation's General Authorisation, the effluent discharged from the Balkfontein Wastewater Treatment Plant complied with the General Standard for Wastewater, except for nitrates and *E. coli*. The final effluent is irrigated onto the golf course at the plant and not discharged into the Vaal River.

Bloemhof Wastewater Treatment Plant

In terms of the Department of Water and Sanitation's Water Use Licence, the effluent discharged from the Bloemhof Wastewater Treatment Plant did not comply with the Special Standard for Wastewater, due to hydraulic and organic overload at the plant. Upon the completion of the upgrade to the plant, the set standards will be complied with.

Christiana Wastewater Treatment Plant

In terms of the Department of Water and Sanitation's Water Use Licence, the effluent discharged from the Christiana Wastewater Treatment Plant mostly complied with the Special Standard for Wastewater.

MAINTENANCE EXPENDITURE

A system of planned maintenance was carried out throughout the 2018/2019 financial year. All buildings, equipment and vehicles were inspected and serviced according to a daily, weekly, monthly, quarterly and annual schedule. Specific refurbishment projects were also implemented as part of the Maintenance Plan for the year under review. Provision for unplanned maintenance (repairs) was made in the Maintenance Budget. This expenditure is reflected in Table 10.

Table 10: Maintenance Expenditure

Year	Expenditure (R)	Increase/(Decrease) in Expenditure (R)	Increase/(Decrease) (%)
2017/2018	20,047,885	(7,543,689)	(27.34)
2018/2019	16,117,622	(3,930,263)	(19.60)

Reservoirs were cleaned according to a scheduled programme throughout the Region. The cleaning programme is also determined by the analysis of the quality of water released from the reservoirs. The joints and seals of the reservoirs were replaced as

and when necessary. Water leaks at the Virginia Module 1 of the primary settling dams were sealed. Some of the more significant maintenance activities are indicated in Table 11.

UPGRADING AND REFURBISHMENT

Upgrading of the Buisfontein-Tsweleng Bulk Water Supply and the Wesselsbron Bulk Water Supply Line

These two projects commenced in September 2016. The projects were put on hold due to challenges relating to funding.

Upgrading of the Koppie Alleen-Ventersburg Bulk Water Supply

Project implementation did not commence due to challenges relating to funding.

New Sludge Dams at the Virginia Plant

An Environment Impact Assessment Study was completed and approved. The tender will be advertised during the 2019/2020 financial year.

OVERVIEW OF PLANNED AND UNPLANNED MAINTENANCE

Table 11 provides an overview of planned and unplanned maintenance performed in the Free State Region during the 2018/2019 financial year.

Table 11: Planned and Unplanned Maintenance in the Free State Region

Planned Maintenance	Unplanned Maintenance
<ul style="list-style-type: none"> • Beatrix pumps (numbers 1 and 2); valves of Virginia primary settling dams, Virginia intake pump station and sludge pumps were included on the Supervisory Control and Data Acquisition (SCADA) computer system; • All transformers at the Balkfontein booster pump stations were serviced; • Balkfontein old high pressure pump station KSB (Number 2) pump motor was repaired; • De Erf KSB pump motors (Numbers 1 and 3) were repaired; • Balkfontein raw water pump (Number 5) was put back in operation after repairs to both motor and pump were done; • The raw water section of the upgrade to the Bloemhof Water Treatment Works was completed and handed over to Sedibeng Water; • Recycle water pumps Numbers 1 and 2) were replaced in Virginia; • Maintenance on the rotating element of pump (Number 2) at Saaiplaas Pump Station; • Maintenance on the rotating element of pump (Number 1) at high pressure pump station in Virginia; • Installation of raw water pump at Christiana Water Treatment Plant; • Covered suction pit with mentis grating and replaced foot valves of the suction pipes at the Christiana Water Treatment Plant; • Replacement of air compressors at the Christiana Water Treatment Plant; 	<ul style="list-style-type: none"> • Installation and alignment of motor at Virginia high pressure pump Number 4; • Coupling replacement and alignment at Virginia high pressure pump Number 2; • Repaired 700mm diameter pipe leak in the chamber of F10 near Bronville; • The Oryx Mine pipeline was repaired as a result of corrosion and cathodic protection failure; • The Welkom 700mm diameter pipeline was repaired; • The 400mm diameter Hennenman supply line was repaired (it is still subjected to excessive corrosion); • Repaired the 500mm diameter Beatrix pipeline; • Repairs were done on the 700mm diameter Welkom ring feed; • Removed a faulty motor of pump Number 2 from the Brabant Pump Station; • Repairs on the pipeline to Wesselsbron (behind the Nyala Mine) were done; • Repaired two leaks on the Wesselsbron line; • Vandalism continues unabated on all the main supply pipelines; • An outlet dirt box on the 400mm Hennenman pipeline was repaired; • Welding patches done on the Leeuwbult pipeline; • Utlwanang tower outlet pipe repaired; • Utlwanang pump repaired and installed; • Repaired the Virginia balancing dam sump pump; • Removed and replaced pumps Numbers 1 and 2 at Lebaleng;

Planned Maintenance	Unplanned Maintenance
<ul style="list-style-type: none"> • Drives coupling and alignment on pump (Number 2) at Brabant Pump Station; • Isolated and scoured Leeuwbult Reservoir (Number 2) and put reservoir (Number 1) back in operation; • A 6m long section of the 500mm Beatrix pipeline was replaced due to aging and lack of cathodic protection following vandalism; • A new sludge pump was installed at the Virginia Plant; • Installation of motor (Number 2) at Brabant Pump Station; • Replaced an 80mm meter inserts at F18 on the Welkom - Saaiplaas pipeline in Welkom; • The poly dosing peristaltic pumps were replaced with automated pumps at the Virginia Water Purification Plant; • Installed 4 new 150mm isolation valves in Hennenman; • Repaired a major leak on the 900mm diameter Welkom - Saaiplaas pipeline; • Replacement of a centre bearing of the thickener at the Christiana Wastewater Works; • Removed Leeudoringstad pump (No. 3) at Balkfontein and sent it for repairs; • Replaced pump Number 5 at Balkfontein old intake pump station with a refurbished one; • Replaced Buisfontein pump (Number 3) at Leeudoringstad; • Removed and replaced pump (Number 2) at the Balkfontein Old High Pressure Pump Station; • Replaced FBL(KSB) pump (Number 3) at De-Erf Old High Pressure Pump Station; • Removed and replaced pump (Number 3) at Bothaville Pump Station; • Removed and replaced delivery and check valves of pump (Number 4) at Old High Pressure Pump Station in Balkfontein; • Removed and replaced Bothaville pump Number 2. 	<ul style="list-style-type: none"> • Removed and replaced sump pump at Old High Pressure Pump Station in Balkfontein; • Constructed new roof structure and roof at Leeudoringstad; • Replaced bio-filter sleeve at the Bloemhof Wastewater Treatment Works; • Replaced compressor with a refurbished one at the Bloemhof Wastewater Treatment Works; • Removed and replaced inlet wash valve at the Balkfontein Filter Block; • Removed and replaced recycling pump at Balkfontein; • Removed and replaced Hoopstad pump Number 2 at Bloemhof; and • Removed and replaced sump pump at Balkfontein Old Intake Pump Station.

CONCLUSION

During the 2018/2019 financial year, the Free State Region succeeded in ensuring the provision of a sustainable and reliable water supply to customers and communities in its operational area. This was done through efficient purification practices,

continuous maintenance, the refurbishment of infrastructure, as well as the development of new infrastructure in order to meet the ever-increasing water demand.