BERGRIVIER MUNICIPALITY

Annual Water Services Development Plan Performance- and Water Services Audit Report

as directed by the Water Services Act (Act 108 of 1997) and the Regulations relating to Compulsory National Standards and Measures to Conserve Water

FY 2017/2018
26 October 2018

BERGRIVIER MUNICIPALITY

PO Box 60
Piketberg
7320

Tel: (022) 913 6000
Fax: (022) 913 1406

Ref 300983

iXengineers (Pty) Ltd
Contact person: Jaco Human
31 Allen Drive, Loevenstein 7530
PO Box 398, Bellville 7535
South Africa
Telephone: +27 (0)21 912 3000
email: jaco.h@ixengineers.co.za
ABN 61 001 279 812

BERGRIVIER MUNICIPALITY

Disclaimer

This report has been prepared on behalf of and for the exclusive use of BERGRIVIER MUNICIPALITY, and is subject to and issued in accordance with the agreement between BERGRIVIER MUNICIPALITY and iX engineers (Pty) Ltd. iX engineers (Pty) Ltd accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying this report without the permission of BERGRIVIER MUNICIPALITY and iX engineers (Pty) Ltd is not permitted.

Version Control:

Status	Description	Date	Reference
Version 1	Draft 2017/2018 Annual WSDP Performance- and Water Services Audit Report	October 2018	Project No. 300983
Approval	Final 2017/2018 Annual WSDP Performance- and Water Services Audit Report	Will be submitted with Annual Report	Council Resolution for the approval of the Audit Report will be forwarded to the DWS by the Mun.

Prepared by:

Designation	Name	Contact No.	E-mail
Manager: Civil Engineering Services	Jaco Breunissen	022 913 6025 / 083 272 3805	breunissenj@bergmun.org.za
Regional Engineer: Civil	Jackie Strumpher	022 913 6000 / 083 655 4567	strumpherj@bergmun.org.za
Regional Engineer: Civil	Leon Gouws	022 783 1112 / 083 272 3791	gouwsl@bergmun.org.za
Head: Civil Services	Rassie Bothma	022 931 2100 / 083 272 4119	bothmar2@bergmun.org.za
Engineer	Jaco Human	021 912 3000 / 084 431 8728	jaco.h@lxengineers.co.za

PROJECT 300983 - BERGRIVIER MUNICIPALITY: ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2017/2018

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
Draft	Draft issued for external review	P Haupt Author	JT Human A Reviewer	Approval	26/10/2018	Approval	29/10/2018
Final	Final Report for Council approval	P Haupt Author	JT Human A Reviewer	Approval	29/10/2018	Approval	

FOREWORD:

Bergrivier Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

The WSDP Performance- and Water Services Audit is designed to monitor the compliance of Bergrivier Municipality with these regulations. It also assists the communities within Bergrivier Municipality's Management Area and the DWS to assess how well the Municipality is performing relative to their stated intentions and their capacity. The Water Services Audit Report can be seen as an annexure to the Municipality's Annual Report. The Annual Report is compiled as required by the Local Government Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121).

The Municipality's overall Blue Drop score came down from 90.60% for 2012 to 63.79% for 2014, which was the last assessment completed by the DWS to date. The DWS mentioned that Bergrivier Municipality was well prepared for the assessment and demonstrated a positive approach to the Blue Drop Certification Programme. Consequently, it is anticipated that through acknowledgement of the identified gaps that progressive improvement in compliance will once again be achieved in future assessments. The overall 2014 Risk Rating for Bergrivier Municipality is 52%.

The overall Green Drop Score of the Municipality came down from 70.00% in 2011 to 44.21% in 2013 and was performing below average with regard to wastewater quality management. The highest Green Drop Score of 62.60% was for the Porterville WWTW and drainage system and the lowest Green Drop Score of 24.23% was for the Eendekuil WWTW and drainage system. The Municipality is however committed to improve their future Green Drop Scores.

The CRRs decreased in two of the systems (Dwarskersbos and Eendekuil) and stayed roughly the same for Piketberg, Porterville and Velddrif during the 2013/2014 Green Drop Progress Reporting in 2014. Upgrades to the system have been made, resulting in improved compliance at most plants. A W_2RAP is in place and are being implemented to ensure that high-risk areas are abated. All indicators are that Bergrivier is showing PROGRESS against the CRR rating over the 2011 to 2012 assessment year. The team is congratulated for their preparedness and positive contribution to the PAT assessments.

The implementation of Bergrivier Municipality's WC/WDM Strategy has been extremely successful and the Municipality was able to reduce the water requirements of the towns significantly. The average annual growth percentage in total raw water requirements for Bergrivier Municipality over the period 2010/2011 to 2017/2018 was -5.66 %/a. The overall percentage of NRW for all the internal distribution systems came down from 10.90% in 2016/2017 to 6.72% for the 2017/2018 financial year, which is excellent.

The Western Cape experienced a severe drought over the last three years, with some relief during the 2018 winter months. The drought reduced the safe yields of the Municipality's own existing surface and groundwater resources. WC/WDM measures to lower the future water requirements and the augmentation of the existing water resources with groundwater or other sources are therefore critical at this stage. Various levels of water restrictions were therefore implemented by Bergrivier Municipality over the last financial year.

A comprehensive Performance Management System and Customer Services and Complaints system are also in place. The SDBIP is the process plan and performance indicator / evaluation process for the execution of the budget. The SDBIP is being used as a management, implementation and monitoring tool that assists and guide the Executive Mayor, Councillors, Municipal Manager, Senior Managers and the community. The plan serves as an input to the performance agreements of the Municipal Manager and Directors. It also forms the basis for the monthly, quarterly, mid-year and the annual assessment report and performance assessments of the Municipal Manager and Directors.

The water and sanitation services of Bergrivier Municipality is managed in a financial sustainable manner. The Operation and Maintenance budget allocated towards the rehabilitation and maintenance of the existing water and sewerage infrastructure however needs to be increased. A budget of approximately 2% of the total asset value per annum should be allocated towards the replacement of existing infrastructure. In the case of the operations and maintenance of the systems, a budget of approximately 1% to 2% of the value of the system is typically required to ensure that the systems remain in good condition.

The Municipality has maintained a high and consistent level of service to its urban water consumers. After hour emergency requests are being dealt with by the control room on a twenty-four hour basis. Bergrivier Municipality further developed a Client Services Charter in collaboration with various stakeholders to affirm their commitment to providing unsurpassed service delivery within the Bergrivier Municipality's Management Area.

"Community involvement and excellent client services are the building blocks of Bergrivier Municipality"

Bergrivier Municipality also successfully completed various capital projects over the last financial year. The capital budget expenditure, for the 2017/2018 financial year, was R1.839 million (50.9% of the budget) for the water infrastructure projects and R13.265 million (98.6% of the budget) for the sewerage infrastructure projects.

BERGRIVIER MUNICIPALITY

WATER SERVICES AUDIT FOR 2017/2018

ITEM **DESCRIPTION** **PAGE**

LIST OF TABLES AND FIGURES

TABLES

LIST OF TABLES AND FIGURES / Continue

TABLES

LIST OF TABLES AND FIGURES / Continue

TABLES

FIGURES

ABBREVIATIONS AND DEFINITIONS

AC	Asbestos Cement
ACIP	Accelerated Community Infrastructure Programme
ADWF	Average Dry Weather Flow
BDS	Blue Drop System
CES	Community Engineering Services
CFO	Chief Financial Officer
COD	Chemical Oxygen Demand
CPM	Contract Programme Manager
CRC	Current Replacement Cost
CRR	Cumulative Risk Ratio
DLG	Department of Local Government
DRC	Depreciated Replacement Cost
DWQ	Drinking Water Quality
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EPWP	Expanded Public Works Programme
ESETA	Energy and Water Services Sector Education and Training Authority
ESKOM	Electricity Supply Commission
FTE	Full Time Equivalents
GAMAP	General Accepted Municipal Accounting Practice
GDS	Green Drop System
GIS	Geographic Information Systems
GRAP	Generally Recognised Accounting Practice
IAM	Infrastructure Asset Management
ICT	Information and Communications Technology
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
ILI	Infrastructure Leakage Index
IMP	Incident Management Protocol
IMQS	Infrastructure Management Query System
IRIS	Integrated Regulatory Information System
IT	Information Technology
IWA	International Water Association
KPI	Key Performance Indicator
km^2	Square Kilometre
LGTAS	Local Government Turn Around Strategy
LM	Local Municipality
m	Metre
MAR	Mean Annual Runoff
MFMA	Municipal Finance Management Act
MIG	Municipal Infrastructure Grant
MISA	Municipal Infrastructure Support Agent
Ml	Mega Litre

ABBREVIATIONS AND DEFINITIONS / Continue

Ml/a	Mega Litre per Annum
Ml/d	Mega Litre per Day
MNF	Minimum Night Flow
MuSSA	Municipal Strategic Self-Assessment
NGA	National Groundwater Archive
NGDB	National Groundwater Database
NQF	National Qualifications Framework
NRW	Non-Revenue Water
O&M	Operation and Maintenance
PAT	Progress Assessment Tool
PRV	Pressure Reducing Valve
RDP	Reconstruction and Development Programme
RR	Risk Rating
RSA	Republic of South Africa
RUL	Remaining Useful Life
SABS	South African Bureau Standard
SALGA	South African Local Government Association
SANS	South African National Standard
SDBIP	Service Delivery and Budget Implementation Plan
SWRO	Sea water reverse osmosis
TMG	Table Mountain Group
UAW	Unaccounted for Water
VAT	Value Added Tax
WARMS	Water Authorisation Registration and Management System
WCDM	West Coast District Municipality
WC/WDM	Water Conservation Water Demand Management
WCWSS	Western Cape Water Supply System
WDM	Water Demand Management
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSI	Water Services Institution
WSP	Water Services Provider
WTW	Water Treatment Works
W_2RAP	Waste Water Risk Abatement Plan
WWTW	Waste Water Treatment Works

KEY TERMS AND INTERPRETATIONS

KEY TERMS	INTERPRETATIONS
Current replacement cost (CRC)	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset. GAMAP defines CRC as the cost the entity would incur to acquire the asset on the reporting date.
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset.
Financial Year	Financial year means in relation to- • a national or provincial department, the year ending 31 March; or • a municipality, the year ending 30 June.
Integrated Development Plan (IDP)	An IDP is a legislative requirement for municipalities, which identifies the municipality's key development priorities; formulates a clear vision, mission and values; formulates appropriate strategies; shows the appropriate organisational structure and systems to realise the vision and the mission and aligns resources with the development priorities.
Municipal Finance Management Act (MFMA)	Municipal Finance Management Act, 2003 (Act No. 56 of 2003)
MIG	A conditional grant from national government to support investment in basic municipal infrastructure.
Remaining useful life (RUL)	The time remaining over which an asset is expected to be used.
Service Delivery Budget Implementation Plan (SDBIP)	The SDBIP is a management, implementation and monitoring tool that enable the Municipal Manager to monitor the performance of senior managers, the Mayor to monitor the performance of the Municipal Manager, and for the community to monitor the performance of the municipality.
Strategic Framework for Water Services	The Strategic Framework provides a comprehensive summary of policy with respect to the water services sector in South Africa and sets out a strategic framework for its implementation over the next ten years.
Water Conservation	The minimisation of loss or waste, the care and protection of water resources and the efficient and effective use of water.
Water Demand Management	The adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability.
Water Services Authority (WSA)	A water services authority means a municipality with the executive authority and the right to administer water services as authorised in terms of the Municipal Structures Act, 1998 (Act No.117 of 1998). There can only be one water services authority in any specific area. Water services authority area boundaries cannot overlap. Water services authorities are metropolitan municipalities, district municipalities and authorised local municipalities.

KEY TERMS AND INTERPRETATIONS / Continue

KEY TERMS	INTERPRETATIONS
Water Services Development Plan (WSDP)	A plan to be developed and adopted by the WSA in terms of the Water Services Act, 1997 (Act No.108 of 1997)
WSDP Guide Framework	Modular tool which has been developed by the DWS to support WSAs in complying with the Water Services Act with respect to Water Services Development Planning and which is also used by the DWS to regulate such compliance.
Water Services Provider (WSP)	A WSP means any person or institution that provides water services to consumers or to another water services institution, but does not include a water services intermediary.
Unaccounted for Water (UAW) SABS 0306 definition	UAW is the difference between the measured volume of water put into the water distribution system and the total volume of water measured to authorised consumers whose fixed property address appears on the official list of the WSA.
Water Balance	The water balance is the difference between the measured volume of potable water put into a water distribution system and the total volume of potable water measured at any intermediate point in the water distribution system. This is a statement setting out the amount of water flowing in and flowing out on an area-by-area basis.

BERGRIVIER MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2017/2018

EXECUTIVE SUMMARY

Bergrivier Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

Section 62 of the Water Services Act requires the Minister to monitor every WSI in order to ensure compliance with the prescribed national standards. This regulation requires a WSA to complete and submit a WSDP Performance- and Water Services Audit Report every financial year.

The WSDP Performance- and Water Services Audit is designed to monitor the compliance of the WSA and other WSIs with these regulations. The Water Services Act allows the audit to be used as a tool to compare actual performance of the WSA against the targets and indicators set in their WSDP. The WSDP Performance- and Water Services Audit also assists local communities and DWS to assess how well WSAs are performing relative to their stated intentions and their capacity.

The WSDP Performance- and Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2017/2018 financial year, and can be seen as an annexure to Bergrivier Municipality's Annual Report. The Annual Report is compiled as required by the Local Government: Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121).

Availability of the Water Services Audit Report: The WSDP Performance- and Water Services Audit Report is a public document and must be made available within four months after the end of each financial year and must be available for inspection at the offices of the WSA. It is also recommended that the document be placed on the Municipality's website and that copies of the document be placed at the public libraries. The WSDP Performance- and Water Services Audit Report also needs to be made available to the Minister of the DWS, the Minister of the Department of Cooperative Governance, the Province and to SALGA, as required by the Water Services Act, 1997.

The WSDP Performance- and Water Services Audit Report include the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2017/2018 financial year, as included in the Municipality's SDBIP.

- The Municipality's Performance with regard to DWS's Blue and Green Drop Assessments. Blue drop status is awarded to those towns that comply with 95% criteria on drinking water quality management. Green drop status is awarded to those WWTWs that comply with 90% criteria on key selected indicators on wastewater quality management.

- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.

- Information to be included in a WSDP Performance- and Water Services Audit as stipulated in regulations under section 9 of the Water Services Act, "Guidelines for Compulsory National Standards" and also required by DWS's 2014 WSDP Performance- and Water Services Audit Report guidelines.

- Information on the implementation of the various WSDP activities, as included under the WSDP Business Elements in DWS's WSDP guidelines.

The Municipality has a comprehensive Performance Management System in place. The SDBIP is the process plan and performance indicator / evaluation for the execution of the budget. The SDBIP is being used as a management, implementation and monitoring tool that assists and guide the Executive Mayor, Councillors, Municipal Manager, Senior Managers and the community. The plan serves as an input to the performance agreements of the Municipal Manager and Directors. It also forms the basis for the monthly, quarterly, mid-year and the annual assessment report and performance assessments of the Municipal Manager and Directors.

The following water and sanitation related investigations were successfully completed during the last financial year.

- The WSDP Performance- and Water Services Audit Report for the 2016/2017 financial year was finalised and approved by Council as part of the Annual Report. The NRW water balance models were updated for each of the distribution systems (Up to the end of June 2017) as part of the Water Services Audit Process.

- Bergrivier Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). Sample results are loaded on a monthly basis onto DWS's IRIS and GDS. All the WTWs and WWTWs are registered on the IRIS and GDS websites.

- The Asset Register was updated to include all the water and sewerage capital projects completed during the 2017/2018 financial year.

- A MIG Technical Report for the upgrading of the St Christopher Sewer Pump Station and Rising Main in Velddrif was compiled. A MIG Technical Report for the Upgrading of the Bulk Sewer for Monte Bertha in Porterville was also compiled.

- Detail WWTW Process Audits were completed for all the WWTWs.

The Municipality also received the following awards / acknowledgements:

- The Municipality's overall Blue Drop score came down from 90.60% for 2012 to 63.79% for 2014. The highest blue drop score was 72.93% for Porterville and the lowest blue drop score was 49.29% for Eendekuil. The DWS mentioned that Bergrivier Municipality was well prepared for the assessment and demonstrated a positive approach to the Blue Drop Certification Programme. Consequently, it is anticipated that through acknowledgement of the identified gaps that progressive improvement in compliance will once again be achieved in future assessments.

  The overall 2014 Risk Rating for Bergrivier Municipality is 52%. This risk value is based on Process Control RR, Drinking Water Quality RR and Risk Management RR, with scores above 50% (medium to critical risks) for Process Control in 4 of the 6 systems and Drinking Water Quality in 3 of the 6 systems.

- The overall Green Drop Score of the Municipality came down from 70.00% in 2011 to 44.21% in 2013 and was performing below average with regard to wastewater quality management. The highest Green Drop Score of 62.60% was for the Porterville WWTW and drainage system and the lowest Green Drop Score of 24.23% was for the Eendekuil WWTW and drainage system. The Green Water Services Audit revealed substantial shortcomings in the areas of risk- and asset management, as well as effluent quality.

  The CRRs decreased in two of the systems (Dwarskersbos and Eendekuil) and stayed roughly the same for Piketberg, Porterville and Velddrif during the 2013/2014 Green Drop Progress Reporting in 2014. Upgrades to the system have been made, resulting in improved compliance at most plants. However, the Velddrif and Eendekuil plants are not meeting standards. A W_2RAP is in place and are being implemented to ensure that high-risk areas are abated. Flows are monitored at each site, with the exception of Dwarskersbos, which receive low flow to the pond system. All indicators are that Bergrivier is showing PROGRESS against the CRR rating over the 2011 to 2012 assessment year. The team is congratulated for their preparedness and positive contribution to the PAT assessments.

- Bergrivier Municipality achieved 100% expenditure in the 2017/2018 financial year on their MIG (DLG) funding received.

Quantity of Water Services Provided (Water Balance)

Detail water balance models are in place for each of the distribution systems in Bergrivier Municipality's Management Area. These models include the volume of potable water supplied to the Bergrivier Municipality by the West Coast District Municipality, the volume of water abstracted from the Municipality's own water resources, the treated volume supplied from the WTW (System Input Volume) and the billed metered consumption for each of the distribution systems. The volume and percentage of NRW were also calculated from the available data. The Municipality also records the flows at the WTWs and WWTWs.

Water Services Delivery Profile

The number of consumer units per category or user type is available for each of the distribution systems. All the households in the urban areas of Bergrivier Municipality's Management Area are provided with water connections inside the erven. Informal areas are provided with shared services as an intermediary measure. Bergrivier Municipality is committed to work with the private landowners to ensure that at least basic water and sanitation services are provided to those households in the rural areas with existing services still below RDP standard.

Cost Recovery and Free Basic Services

A detail six-block step tariff system is implemented by Bergrivier Municipality for their residential consumers. This tariff system discourages the wasteful or inefficient use of water. It is expected that this tariff structure will continue to be implemented in the future. The sustainable supply of potable water is however becoming an ever-increasing challenge, due to the huge bulk infrastructure needs of Bergrivier Municipality over the next number of years.

The first six (6) kl of water is provided free to all indigent households. Bergrivier Municipality's tariffs support the viability and sustainability of water supply services to the poor through cross-subsidies (where feasible). Free basic water and sanitation services are linked to the Municipality's Indigent Policy and all indigent households therefore receive free basic water and sanitation services. This implies that either the equitable share is used to cover this cost, or higher consumption blocks are charged at a rate greater than the cost in order to generate a surplus to cross-subsidise indigent consumers who use up to six (6) kilolitres per month.

The operational budget of the past five financial years for water and sanitation services is summarised in the table below:

Service	Expenditure / Income	Actual 17/18	Actual 16/17	Actual 15/16	Actual 14/15	Actual 13/14
Water	Expenditure	R20 478 535	R20 772 362-34	R19 439 616-11	R17 622 645-14	R16 489 805-52
	Income	-R20 341 100	-R35 105 263-77	-R41 302 944-69	-R38 793 306-82	-R21 182 113-66
	Surplus / Deficit	**R137 435**	**R14 332 901-43**	**R21 863 328-58**	**R21 170 661-68**	**R4 692 308-14**
Sanitation	Expenditure	R9 987 129	R11 739 421-87	R9 728 729-15	R6 717 358-48	R8 359 993-41
	Income	-R27 018 427	-R16 578 073-16	-R18 266 193-46	-R18 005 379-38	-R27 065 082-86
	Surplus / Deficit	**-R17 031 298**	**R4 838 651-29**	**R8 537 464-31**	**R11 288 020-90**	**R18 705 089-45**

Water Quality

Operational and Compliance Water Quality sampling programmes are implemented by the Bergrivier Municipality and the West Coast District Municipality. Operational and Compliance Final Effluent Quality sampling programmes are also implemented by Bergrivier Municipality at the various WWTWs.

The percentage compliance of the water quality samples taken over the period July 2017 to June 2018 for the various distribution systems are summarised in the table below (SANS 241:2015 Limits).

Distribution System	Acute Health Chemical	Acute Health Microbiological	Chronic Health	Aesthetic	Operational Efficiency
Porterville	100.0%	99.1%	100.0%	92.7%	99.7%
Piketberg	100.0%	***91.8% ****	***87.2% ****	93.3%	94.1%
Dwarskersbos	100.0%	96.2%	96.8%	98.2%	92.5%
Velddrif	100.0%	***91.9% ****	93.3%	96.5%	98.7%
Aurora	100.0%	99.0%	100.0%	99.0%	94.8%
Eendekuil	100.0%	100.0%	100.0%	94.9%	99.1%
Redelinghuys	100.0%	***92.9% ****	95.9%	96.6%	97.3%

Note: **** Unacceptable***

The table below indicates the compliance of the E.Coli monitoring frequency in the water distribution systems of Bergrivier Municipality, in terms of the minimum requirements of SANS 0241:2015 (Table 2). The period assessed was for samples taken from July 2017 to June 2018.

Distribution System	Population served	Required number of monthly samples (SANS 241-2:2015: Table 2)	Average number of monthly microbiological compliance samples taken by the Bergrivier Municipality during 2017/2018
Porterville	7 716	2	9.4
Piketberg	13 598	2.7	12.0
Velddrif	14 764	3.0	12.2
Dwarskersbos	824	2	4.3
Aurora	614	2	8.6
Eendekuil	1 723	2	7.8
Redelinghuys	591	2	8.1
Total	**39 830**	**15.7**	**62.3**

It can be noted from the above table that the number of monthly E.Coli samples taken by the Municipality during the 2017/2018 financial year was far more than the required number of samples for all the water distribution systems.

The overall percentage compliances of the final effluent samples taken over the last three financial years at the Dwarskersbos, Eendekuil, Piketberg, Porterville and Velddrif WWTW (General Limits) are summarised in the table below.

WWTW	Microbiological			Chemical			Physical		
	17/18	16/17	15/16	17/18	16/17	15/16	17/18	16/17	15/16
Dwarskersbos	100.0%	100%	100.0%	84.6%	83.3%	0.0%	26.9%	16.7%	29.2%
Eendekuil	100.0%	100%	100.0%	25.0%	33.3%	41.7%	100.0%	100.0%	100.0%
Piketberg	81.8%	83.3%	100.0%	93.2%	91.7%	97.9%	81.8%	86.1%	97.2%
Porterville	66.7%	75.0%	81.8%	66.7%	85.4%	97.7%	88.9%	94.4%	100.0%
Velddrif	100.0%	100.0%	100.0%	77.1%	77.1%	83.3%	83.3%	75.0%	86.1%
Overall Compliance %	**90.0%**	**91.7%**	**96.6%**	**75.2%**	**81.0%**	**82.2%**	**77.4%**	**76.9%**	**85.0%**

WC/WDM

Bergrivier Municipality's WC/WDM Strategy was updated during 2014/2015 and was previously approved by Council in 2013. The implementation of Bergrivier Municipality's WC/WDM Strategy has been extremely successful and the Municipality was able to reduce the water requirements of the towns significantly. The average annual growth percentage in total raw water requirements for Bergrivier Municipality over the period 2010/2011 to 2017/2018 was -5.66 %/a.

The overall percentage of NRW for all the internal distribution systems was only 6.72% for the 2017/2018 financial year, which is excellent. The table below gives a summary of the NRW and the ILI for each of the distribution systems in Bergrivier Municipality's Management Area.

Description	Unit	17/18	Record : Prior (Ml/a)					
			16/17	15/16	14/15	13/14	12/13	11/12
Porterville	Volume	18.704	97.301	97.391	122.740	64.188	57.359	77.961
	Percentage	5.3%	19.5%	18.9%	22.1%	13.9%	12.3%	16.4%
	ILI	**0.47**	**2.50**	**2.57**				
Piketberg	Volume	50.231	93.754	69.401	75.956	171.938	137.581	157.934
	Percentage	9.5%	11.3%	8.3%	9.0%	20.5%	17.2%	19.4%
	ILI	**0.63**	**1.17**	**0.85**				
Velddrif	Volume	5.184	44.615	103.854	158.547	80.910	82.753	10.066
	Percentage	0.8%	4.5%	10.4%	17.8%	9.1%	9.1%	1.9%
	ILI	**0.08**	**0.90**	**2.19**				
Dwarskersbos	Volume	5.928	0.172	4.860	-0.073	7.806	17.381	4.796
	Percentage	10.0%	0.2%	4.7%	-0.1%	7.5%	17.5%	5.1%
	ILI	**1.15**	**0.00**	**0.85**				
Aurora	Volume	4.408	10.345	1.090	-3.388	5.572	-0.887	-5.448
	Percentage	15.8%	20.2%	2.3%	-8.2%	13.1%	-2.3%	-13.6%
	ILI	**0.44**	**1.03**	**0.03**				
Eendekuil	Volume	22.223	27.450	26.295	12.584	-7.452	7.033	0.101
	Percentage	31.2%	28.8%	27.0%	15.6%	-12.0%	9.1%	0.1%
	ILI	**4.05**	**4.96**	**4.69**				
Redelinghuys	Volume	8.235	11.059	19.753	21.917	24.531	23.314	24.820
	Percentage	23.3%	22.5%	35.7%	36.5%	39.6%	39.9%	40.3%
	ILI	**3.16**	**4.25**	**7.33**				
Total	**Volume**	**114.913**	**284.696**	**322.644**	**388.283**	**347.493**	**324.534**	**270.230**
	Percentage	**6.72%**	**10.90%**	**12.13%**	**15.14%**	**14.13%**	**13.24%**	**10.93%**
	ILI	**0.53**	**1.34**	**1.54**				

Note: Infrastructure Leakage Index (ILI) for Developed Countries = **1 – 2 Excellent (Category A)**, **2 – 4 Good (Category B)**, **4 – 8 Poor (Category C)** and > **8 – Very Bad (Category D)**

Category A = No specific intervention required.

Category B = No urgent action required although should be monitored carefully.

Category C = Requires attention

Category D = Requires immediate water loss reduction interventions

Water Services Infrastructure Management

Bergrivier Municipality's Asset Register needs to be updated to include the CRC of all the water and sewerage infrastructure. The Municipality also needs to ensure that all the existing water and sewerage infrastructure are included in the Asset Register. The table below give an overview of the Opening Costs, Book Values, RUL, Age distribution and Condition grading of the water and sewerage assets currently included in the Asset Register (June 2018).

Asset Type	Opening Costs		Book Values		% Book Values / Opening Costs
Water Infrastructure	R74 780 663		R53 633 508		71.72%
Sewerage Infrastructure	R71 924 057		R52 439 218		72.91%
Remaining Useful Life (Opening Costs)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Water Infrastructure	R2 165 714	R7 803 522	R27 813 677	R0	R36 997 748
Sewerage Infrastructure	R2 867 207	R11 861 721	R8 745 556	R6 599 665	R41 849 907
Age Distribution (Opening Costs)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Water Infrastructure	R32 674 050	R20 923 155	R326 457	R7 507 161	R13 349 840
Sewerage Infrastructure	R31 897 710	R29 686 765	R1 676 051	R239 054	R8 424 476
Condition Grading (Opening Costs)					
Asset Type	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**
Water Infrastructure	R35 534 962	R0	R11 939 727	R27 305 974	R0
Sewerage Infrastructure	R33 966 463	R2 104 732	R222 658	R35 521 781	R108 423

It is important for Bergrivier Municipality to allocate adequate funds for the rehabilitation and maintenance of their existing infrastructure, which is critical to ensure the sustainability of the services that are provided by the Municipality. All possible external sources of funding to assist with the development of the bulk infrastructure and additional sources need to be identified.

Associated Services

All schools and medical facilities in Bergrivier Municipality's Management Area are supplied with adequate water and sanitation services.

Water Resources

A Service Level Agreement is in place with the West Coast District Municipality for the provision of bulk potable water to Velddrif and Dwarskersbos. A new bulk raw water licence was issued to the West Coast District in October 2017, which include a volume of 1 439.4 Ml/a for Bergrivier Municipality from the Berg River (Abstraction at Misverstand Dam). This allocation is for Velddrif and Dwarskerbos, currently supplied by the West Coast District Municipality with potable water. The Municipality needs to apply to the DWS for an increased allocation from the Berg River for Piketberg. The safe yields of the Redelinghuys and Aurora sources need to be determined in order to determine whether the yields from these resources are adequate to meet the town's future water requirements. The yields from the existing resources for Eendekuil and Porterville are adequate to meet the short to medium future water requirements of these two towns.

The table below gives an overview of the years in which the annual water requirement will exceed the allocations, licences or sustainable yields from the various resources.

Distribution System	Allocation (A) / Yield (Y) / Licence (L) (Ml/a)	Annual Growth on 2017/2018 requirement (%)	Annual Growth on 2017/2018 requirement (%)	WSDP Projection Model
Porterville	711.385 (Y)	> 2042 (1%)	2035 (2%)	2036
Piketberg	945.075 (A)	2024 (3%)	2022 (4%)	2030
Velddrif	1 295.460 (L)	2039 (2%)	2032 (3%)	2025
Dwarskerbos	143.940 (L)	> 2042 (2%)	2038 (3%)	2038
Aurora	56.000 (A)	2028 (1.5%)	2023 (2.5%)	2024
Eendekuil	116.435 (Y)	2027 (2%)	2023 (3%)	2028
Redelinghuys	46.500 (A)	Over (1%)	Over (2%)	Over

Note: The sustainable yield of the Aurora and Redelinghuys water resources needs to be determined, which might affect the figures included in the above table.

Institutional Arrangement Profile

Bergrivier Municipality is the WSA for the entire Municipal Management Area. A Service Level Agreement is in place with the West Coast District Municipality for the provision of bulk potable water to Velddrif and Dwarskersbos. The Municipal staff is continuously exposed to training opportunities, skills development and capacity building at a technical, operations and management level in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled annually and the specific training needs of the personnel, with regard to water and wastewater management are determined annually.

Social and Customer Services Requirements

A comprehensive Customer Services and Complaints system is in place at Bergrivier Municipality and the Municipality has maintained a high and a very consistent level of service to its urban water consumers. After hour emergency requests are being dealt with by the control room on a twenty-four hour basis.

Bergrivier Municipality further developed a Client Services Charter in collaboration with various stakeholders to affirm their commitment to providing unsurpassed service delivery within the Bergrivier Municipality's Management Area.

"Community involvement and excellent client services are the building blocks of Bergrivier Municipality"

Barriers implemented by Bergrivier Municipality against contamination and deteriorating water quality include the following:

- Service Delivery Agreement between the West Coast District Municipality and Bergrivier Municipality. A Monitoring Committee is also in place.
- Participate in catchment management and water source protection initiatives.
- Protection at points of abstraction such as river intakes and dams (Abstraction Management).
- Correct operation and maintenance of the WTWs (Coagulation, flocculation, sedimentation and filtration).
- Protection and maintenance of the distribution systems. This includes ensuring an adequate disinfectant residual at all times, rapid response to pipe bursts and other leaks, regular cleaning of reservoirs, keeping all delivery points tidy and clean, etc.

Three other important barriers implemented by Bergrivier Municipality against poor quality drinking water that are a prerequisite to those listed above are as follows:

- A well-informed Council and municipal managers that understand the extreme importance of and are committed to providing adequate resources for continuous professional operation and maintenance of the water supply system.

- Competent managers and supervisors in the technical department who are responsible for water supply services lead by example and are passionate about monitoring and safeguarding drinking water quality.

- Well-informed community members and other consumers of water supply services that know how to protect the water from becoming contaminated once it has been delivered, that have respect for water as a precious resource and that adhere to safe hygiene and sanitation practices.

BERGRIVIER MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2017/2018

BACKGROUND

Appointment

iX engineers was appointed by Bergrivier Municipality to assist them with the compilation of their 2017/2018 WSDP Performance- and Water Services Audit Report, which forms part of their annual report for the 2017/2018 financial year. The purpose of the WSDP Performance- and Water Services Audit Report is to report on the implementation of Bergrivier Municipality's previous year's WSDP, for the 2016/2017 financial year.

The DWS developed the "Annual Water Services Development Plan Performance- and Water Services Audit Report" template during 2014, to assist Municipalities with the drafting of their reports. iX engineers agreed with Bergrivier Municipality to follow this template as far as possible.

Purpose

Bergrivier Municipality is required in terms of Section 18 of the Water Services Act, 1997 (Act No.108 of 1997), as well as the "Regulations relating to compulsory national standards and measures to conserve water", as issued in terms of sections 9(1) and 73(1)(j) of the Water Services Act, to report on the implementation of its WSDP during each financial year and to include a water services audit in such an annual report.

Section 62 of the Water Services Act requires the Minister to monitor every WSI in order to ensure compliance with the prescribed national standards. This regulation requires a WSA to complete and submit a WSDP Performance- and Water Services Audit every financial year. The WSDP Performance- and Water Services Audit is designed to monitor the compliance of the WSA and other WSIs with these regulations. The Water Services Act allows the audit to be used as a tool to compare actual performance of the WSA against the targets and indicators set in their WSDP. The purpose of the water services audit is as follows:

- To monitor compliance with the Act and these regulations;
- To compare actual performance against targets contained in the WSDPs.
- To identify possibilities for improving water conservation and water demand management.

The WSDP Performance- and Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2017/2018 financial year, and can be seen as an annexure to Bergrivier Municipality's Annual Report. The Annual Report is compiled as required by the Local Government: Municipal Systems Act, Act no 32 of 2000 (Section 46) and the Local Government: Municipal Finance Management Act, Act no 56 of 2003 (Section 121). The WSDP Performance- and Water Services Audit Report contain the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2017/2018 financial year, as included in the Municipality's SDBIP.
- The Municipality's Performance with regard to DWS's Blue and Green Drop Assessments. Blue drop status is awarded to those towns that comply with 95% criteria on drinking water quality management. Green drop status is awarded to those WWTWs that comply with 90% criteria on key selected indicators on wastewater quality management.
- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.

- Information to be included in a WSDP Performance- and Water Services Audit as stipulated in regulations under section 9 of the Water Services Act, "Guidelines for Compulsory National Standards" and also required by DWS's 2014 WSDP Performance- and Water Services Audit Report guidelines.

- Information on the implementation of the various WSDP activities, as included under the WSDP Business Elements in DWS's WSDP guidelines.

A. WATER SERVICES AUTHORITY PROFILE

A.1. Map of Water Services Authority Area of Jurisdiction

Bergrivier Municipality is located in the West Coast Region of the Western Cape, as indicated on the figure below.

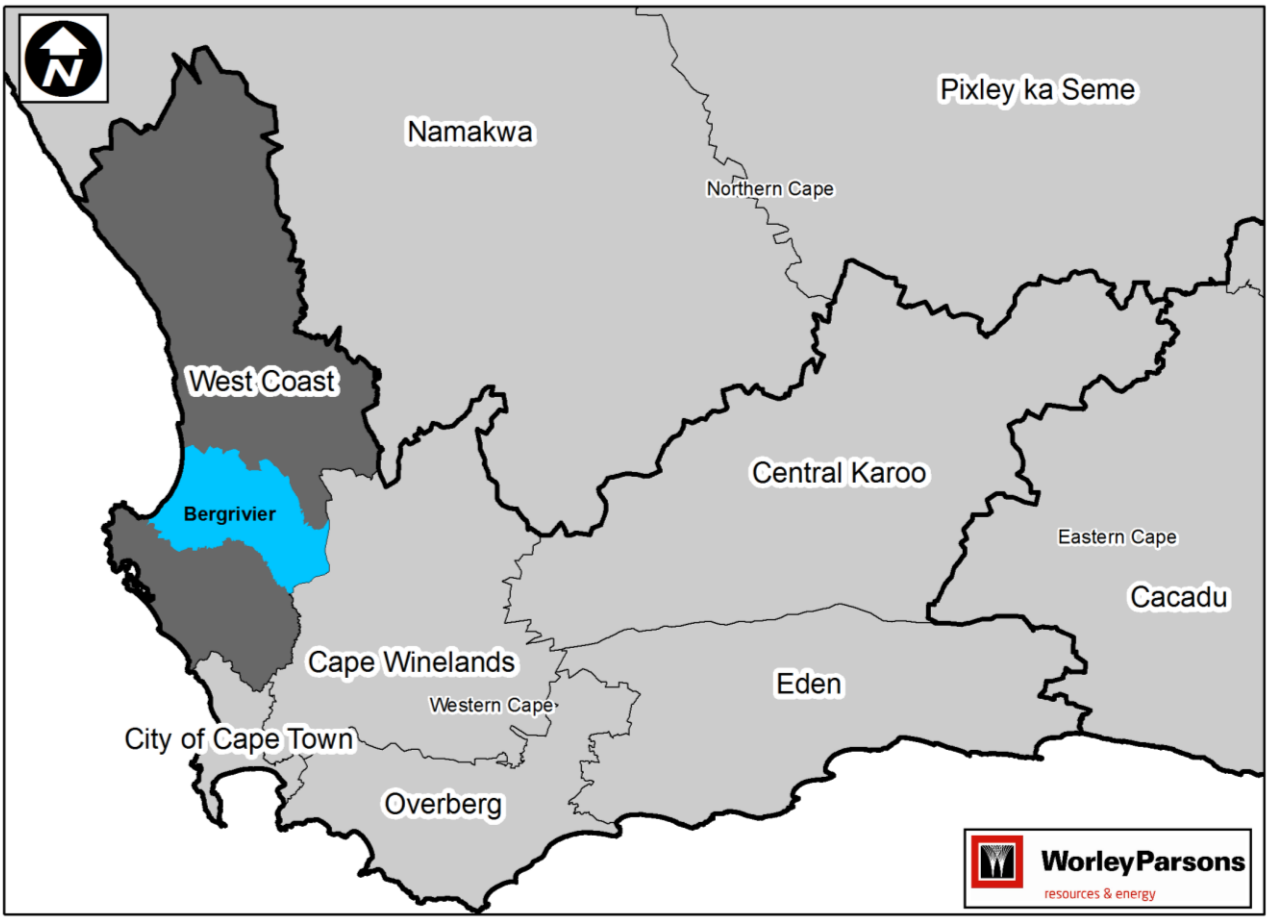


Figure A.1.1: Location of Bergrivier Municipality in the Western Cape

The figure below gives an overview of Bergrivier Municipality's Management Area and the settlements located in the Area.

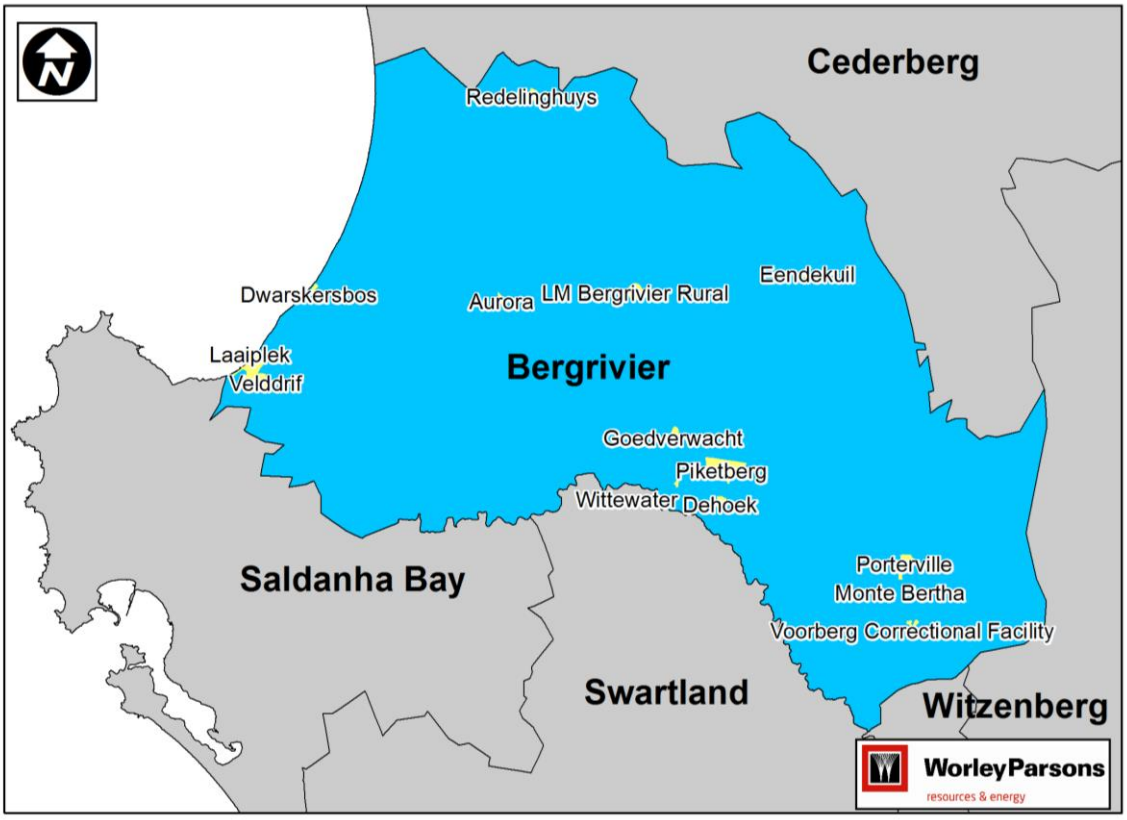


Figure A.1.2: Bergrivier Municipality's Management Area

The Municipality is bordered to the North by the Cederberg Municipality, to the West by the Saldanha Bay Municipality, to the South by Swartland Municipality and to the East by the Drakenstein and Witzenberg Municipalities. The Municipality covers a diverse geographical area of approximately 4 407.04 km². The various schemes supplied with bulk water by Bergrivier Municipality are discussed in more detail under Section A.3. The existing water and sewerage infrastructure of the various distribution systems are indicated on the Aerial Photos included in the Municipality's detail WSDP documents.

The following table provides an overview of the various settlements that constitute the Bergrivier Municipality's Management Area:

Table A.1.1: Overview of settlements in Bergrivier Municipality's Management Area	
Aurora	Aurora is also classified as an isolated village. The town has a rural character against a picturesque topographical setting. This town has no autonomous economic base other than the accommodation of farm workers involved in the nearby farms and basic provision associated with this use.
Dwarskersbos	Dwarskersbos is a coastal town characterized by its property market, holiday accommodation and tourism. The sea and coastal area are the most important natural resources. The main function of the town is to provide holiday accommodation. Tourism, retirees and second home residents provide a solid base for the local economy.
Eendekuil	Eendekuil is also classified as an isolated village. It functions as a low-order agricultural service centre that is dependent on Piketberg for higher-order services. Mainly a dormitory town for farm workers and retired people. This town has no autonomous economic base other than the accommodation of farm workers involved in the nearby farms and basic service provision associated with this use.
Piketberg (Including Piket Bo Berg)	Piketberg is classified as a central place and is the administrative seat of the Bergrivier Municipality. It is also the service and commercial centre of the surrounding agricultural area. The primary economic base of Piketberg is agriculture. Public-sector activities related to the municipal head office, district offices, provincial government offices and other public functions also provide a solid base for the local economy.
Porterville (Including	Porterville is also classified as a central place and sound infrastructure has contributed towards the establishment of a Regional Kaap Agri Office as well as the Voorberg prison. The economic base of

Table A.1.1: Overview of settlements in Bergrivier Municipality's Management Area	
Dasklip Pass)	Porterville is primarily agriculture, which is supplemented by some recreational and tourism activities.
Redelinghuys	Redelinghuys is classified as an isolated village. The town mainly functions as a residential area for the surrounding agricultural sector and retired people. There is some recreational and tourism potential in the Verlorenvlei area which is a Ramsar Site which falls partially within Bergrivier's area of jurisdiction. This town has no autonomous economic base other than the accommodation of farm workers involved in the nearby farms and basic service provision associated with this use.
Velddrif (Including Laaiplek, Port Owen and Noordhoek)	Velddrif is a coastal town, which functions as a focal point for the fishing industry along the West Coast. The most important resources are the sea, the coastal environment, salt pans and the Bergrivier Estuary. Tourism, retirees and second home residents provide a solid base for the local economy.
Goedverwacht and Wittewater	Goedverwacht and Wittewater are also classified as isolated villages. These towns are located on private land, within a predominantly agricultural area. They are Mission Stations run by the Moravian Church of South Africa, and have little direct investment to stimulate economic activities. Inhabitants work mainly on the surrounding farms, but the villages do boast some very good builders. The scenic mountains and the missionary culture offer some tourism potential, but this can only be realized within the context of the larger tourism plan for the region.

A.2. Water Services Administration and Organization

Bergrivier Municipality is the WSA for the entire Municipal Management Area. The small rural settlements of Goedverwacht and Wittewater are however, Moravian Mission stations and the services are managed by the Church and Bergrivier Municipality only provides a support service to the Church. Bergrivier Municipality's Organogram for Engineering Services is included in Annexure F. The table below gives the contact details of the persons responsible for water services management and planning within Bergrivier Municipality.

Table A.2.1: Water Services Administrative Structure	
Accounting Officer	
Designation	Municipal Manager
Name	Adv. H Linde
Telephone Nr.	022 913 6012
Cell Nr.	082 448 1231
Email	MM@bergmun.org.za
WSA Manager	
Designation	Manager: Civil Services
Name	Mr J Breunissen
Telephone Nr.	022 913 6025
Cell Nr.	083 272 3805
Email	breunissenj@bergmun.org.za
WSP Manager	
Designation	Manager: Civil Services
Name	Mr J Breunissen
Telephone Nr.	022 913 6025
Cell Nr.	083 272 3805
Email	breunissenj@bergmun.org.za
WSDP Manager	
Designation	Manager: Civil Services
Name	Mr J Breunissen
Telephone Nr.	022 913 6025
Cell Nr.	083 272 3805
Email	breunissenj@bergmun.org.za
IDP Manager	
Designation	Manager: Strategic Services
Name	Ms A van Sittert
Telephone Nr.	022 913 6076
Cell Nr.	083 607 4644
Email	sb@bergmun.org.za

A.3. Water Services Overview

Bergrivier Municipality is situated within the newly established Berg-Olifants Water Management Area. The Municipality further falls within the West Coast Region of the Western Cape Province, in which the following Local Municipalities are also located:

- Matzikama Municipality;
- Cederberg Municipality;
- Swartland Municipality; and
- Saldanha Bay Municipality

The Municipality comprises of nine (9) urban settlements, approximately 40 kilometres of coastline and a vast rural area. The main urban settlements that constitute the Municipality are Piketberg, which is the administrative head office, Porterville, Velddrif (which include Port Owen, Laaiplek and Noordhoek), Dwarskersbos, Eendekuil, Aurora, Redelinghuys, Goedverwacht and Wittewater. Another settlement, De Hoek, also falls within the municipal boundary, but is not serviced in respect of water by the Municipality.

The Municipality consists of seven (7) individual wards, and is the only WSA within this municipal area. It is also the Water Services Provider (WSP). Bulk potable water is however provided to the towns of Velddrif and Dwarskersbos by the West Coast District Municipality through their Withoogte bulk water distribution system. The bulk potable water supplied from the Withoogte WTW is augmented by abstraction of groundwater from the Langebaan Road Groundwater Aquifer System. The bulk distribution scheme is a cross-border scheme and supply water to Bergrivier Municipality, Swartland Municipality and Saldanha Bay Municipality. A Service Level Agreement between the West Coast District Municipality and Bergrivier Municipality is in place for the provision of bulk potable water to these two towns. Bergrivier Municipality's responsibility as WSA also extends to the rural areas within its Municipal boundary.

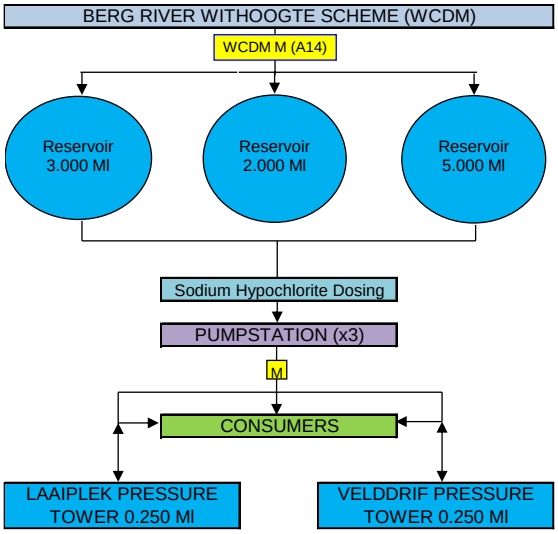
Bergrivier Municipality's Management Area includes the following areas (***Water Distribution Systems***):

- Porterville - ***Porterville Water Distribution System***
- Piketberg – ***Piketberg Water Distribution System***
- Velddrif – ***Velddrif Water Distribution System***
- Dwarskersbos – ***Dwarskersbos Water Distribution System***
- Aurora – ***Aurora Water Distribution System***
- Eendekuil – ***Eendekuil Water Distribution System***
- Redelinghuys – ***Redelinghuys Water Distribution System***
- Wittewater, managed by the Moravian Church
- Goedverwacht, managed by the Moravian Church
- The rural farm areas

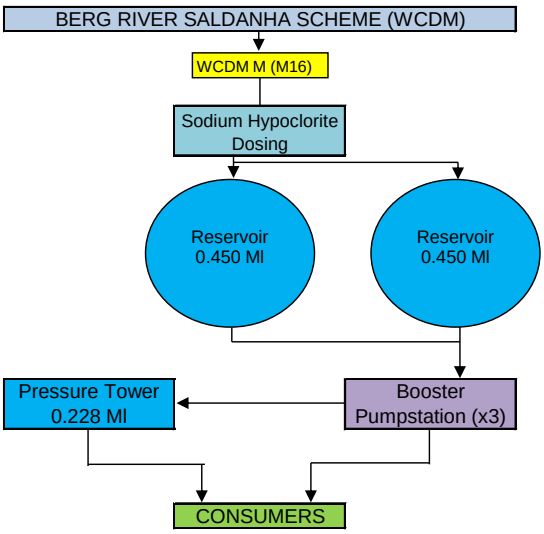
The towns in Bergrivier Municipality's Management Area supplied with bulk potable water by the West Coast District Municipality are as follows:

Velddrif: Potable water is supplied to Velddrif by the West Coast District Municipality as part of the Withoogte Regional Scheme, which forms part of the Western Cape Water Supply System. The Voëlvlei Dam is the main storage dam to supply water to this part of the system, as well as the Berg River. Water can also be released from the Berg River Dam in the upper part of the Berg River should it be necessary. Raw water is pumped from the Misverstand Weir to the Withoogte WTW for treatment, before distribution to the various West Coast District Municipality's consumers. The potable water supplied by the West Coast District Municipality to Velddrif is stored in two reservoirs in Velddrif, with a total storage capacity of 10.000 Ml. There are also two water towers with a total storage capacity of 0.500 Ml in Velddrif.

Dwarskersbos: Potable water is also supplied to Dwarskersbos from the Withoogte WTW. The potable water is stored in two reservoirs in Dwarskersbos, with a total storage capacity of 0.900 Ml and a water tower with a capacity of 0.228 Ml.



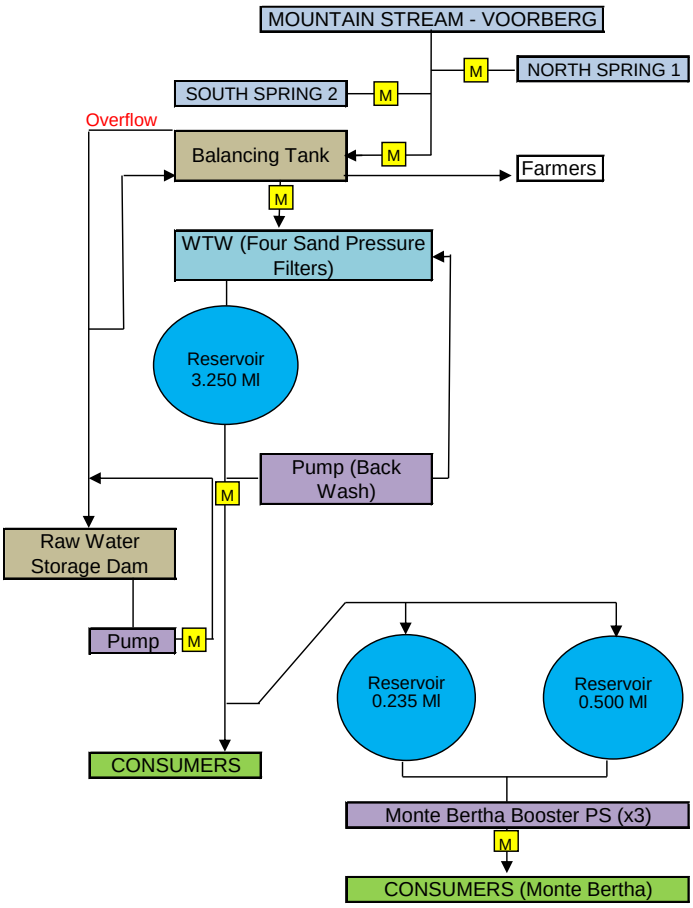
Velddrif



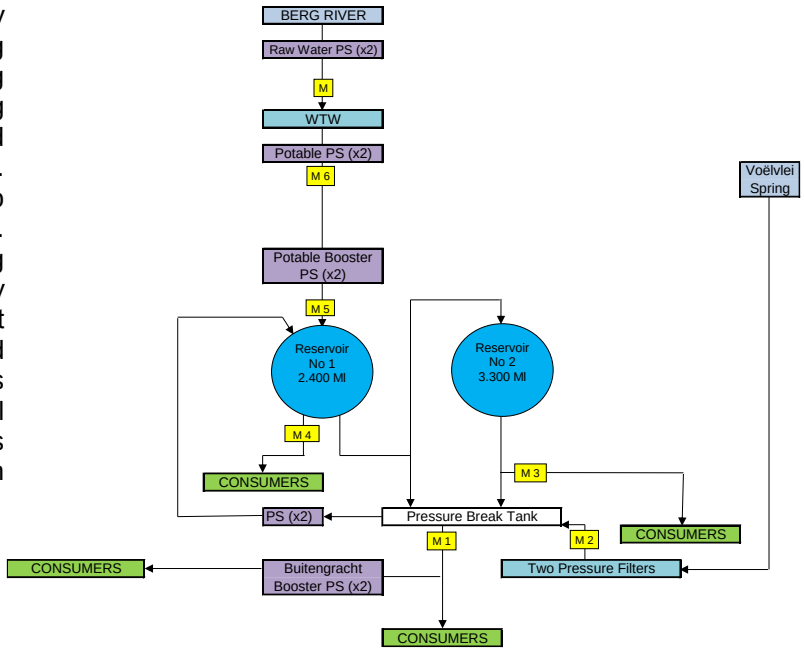
Dwarskersbos

The towns supplied with bulk water by the Bergrivier Municipality are as follows:

Porterville: Bulk raw water is supplied to the Porterville WTW from two springs (South and North) and the Voorberg Stream. The raw water flows through a balancing tank to the WTW and the overflow water is stored in a dam just below the WTW from where it can also be pumped back to the WTW. A new bulk raw water pipeline was constructed during the 2015/2016 financial year to supply raw water to the farmers, according to the new Service Level Agreement. The WTW consists of four pressure sand filters. The potable water is stored in the town's main reservoir with a storage capacity of 3.250 Ml from where it gravitates to the town and the two Monte Bertha reservoirs, with a total storage capacity of 0.735 Ml.

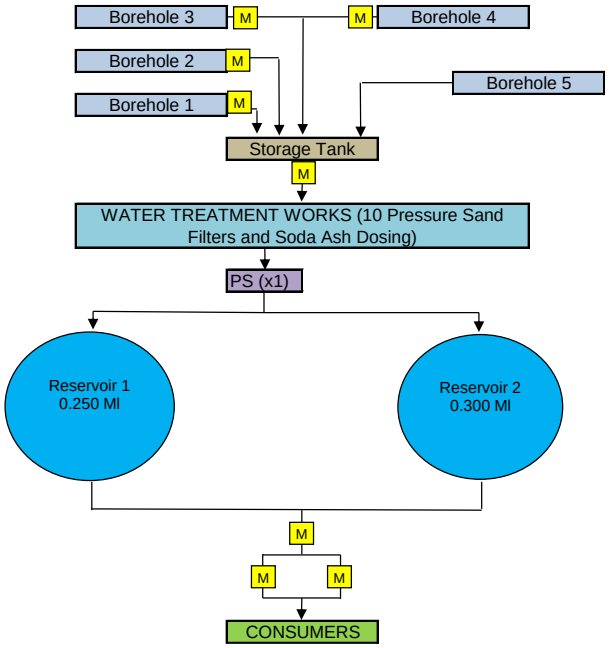


Piketberg: Bulk raw water is primarily supplied to Piketberg from the Berg River. Water is pumped from the Berg River pump station to the Piketberg WTW, where the water is treated and the final water is pumped to the town. Piketberg is allowed to abstract up to 0.704 million m³/a from the Berg River. Bulk water is also supplied to Piketberg from the Voëlvlei Spring, with roughly 15% of Piketberg's total system input volume for the last four years supplied from this source. Potable water is stored in two reservoirs with a total storage capacity of 5.700 Ml before it is distributed to the consumers in Piketberg.

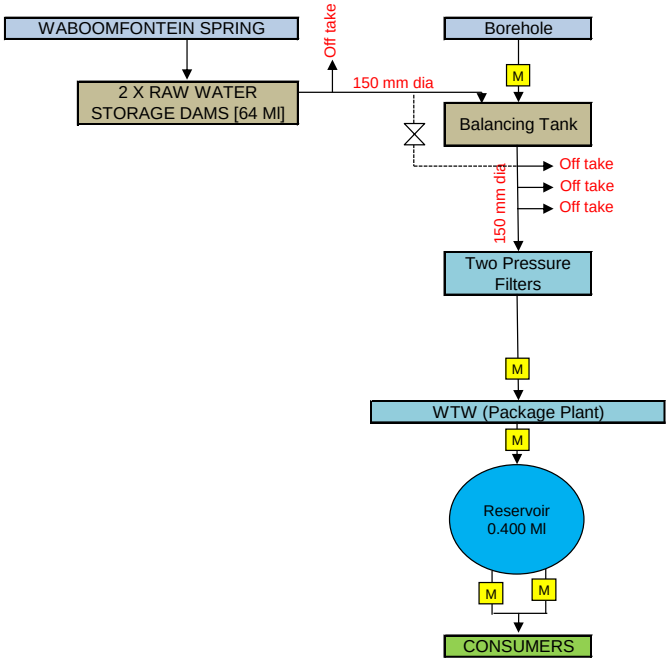


Aurora: Bulk raw water supply to Aurora is from five boreholes. The water is pumped from the boreholes to the Aurora WTW for treatment. The WTW consists of ten pressure sand filters, with soda-ash dosing. The treated water from the WTW is pumped to the town's two reservoirs with a total storage capacity of 0.550 Ml. The water gravitates from the two reservoirs to the consumers in Aurora.

Eendekuil: Bulk raw water gravitates to the Eendekuil WTW from two raw water storage dams (Capacity of 64 Ml) outside the town. The drainage to the dams is from the Waboomfontein spring. The supply from the dams can also be supplemented with groundwater from one borehole outside the town. There are two pressure filters on the bulk supply pipeline to the WTW (Package Plant). Treated water from the WTW is stored in a 0.400 Ml reservoir form where it gravitates to the consumers in Eendekuil.

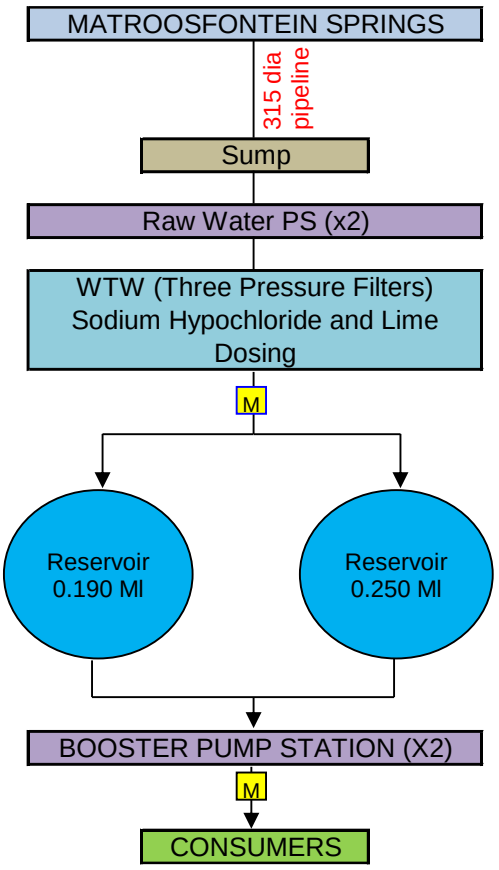


Aurora



Eendekuil

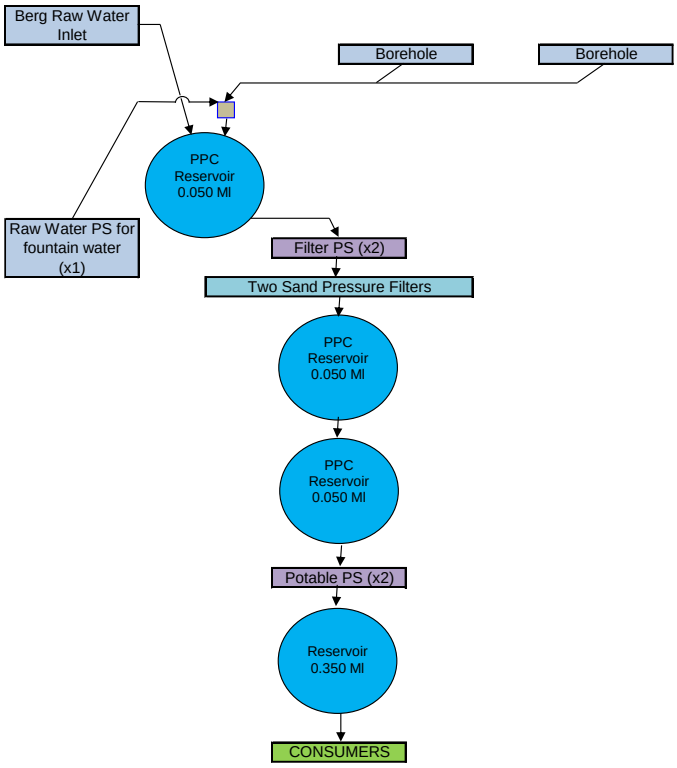
Redelinghuys: Bulk raw water gravitates to the Redelinghuys WTW from the Matroosfontein Springs via a 315mm diameter pipeline. The WTW consists of three pressure filters, with sodium hypochlorite and lime dosing. Final treated water from the WTW is pumped to the two storage reservoirs with a total capacity of 0.440 Ml, from where it gravitates to the consumers in Redelinghuys.



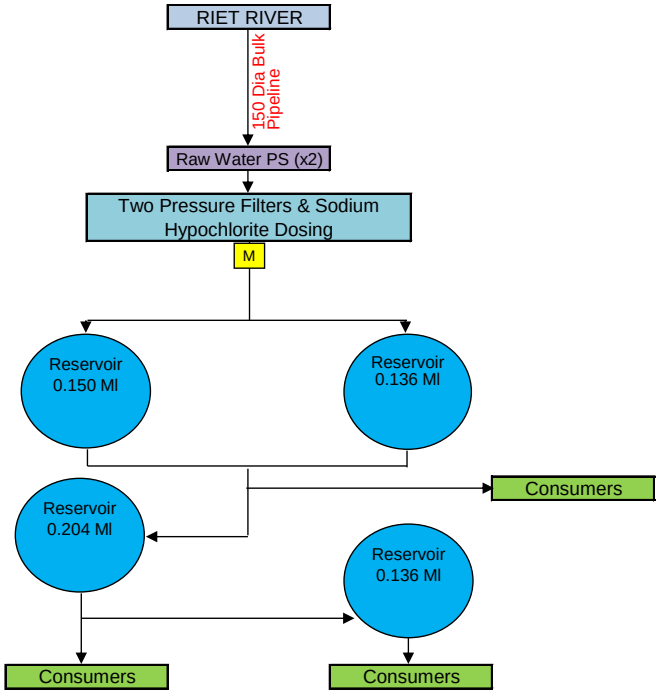
The towns managed by the Moravian Church, for which Bergrivier Municipality only provides a support service, are as follows:

Wittewater: The town relies on surface water abstracted from the local stream and a fountain that also feed the stream. Groundwater is also pumped from two boreholes to the WTW. The WTW consists of two sand pressure filters that treat the raw water, before the potable water is pumped to the town's main storage reservoir with a storage capacity of 0.350 Ml.

Goedverwacht: Raw water is abstracted from the Riet River and distributed via a 150mm diameter pipeline to the WTW. The WTW consists of two pressure filters with sodium hypochlorite dosing. From there the treated water is distributed to four reservoirs, with a total capacity of 0.626 Ml. Potable water gravitates from these reservoirs to the consumers in Goedverwacht.



Wittewater



Goedverwacht

The table below gives an overview of the major **water infrastructure** components, for the various distribution systems, in Bergrivier Municipality's Management Area.

Table A.3.1: Summary of existing main water infrastructure

Water Distribution System	Bulk Supply (Resources)	WTW (Capacity in Ml/d)	Bulk and Reticulation (km)	Number of Water PS (RW / TW)	Number of Reservoirs (Storage in Ml)
Porterville	Voorberg Mountain Stream Two Springs	2.270	3.565 (Bulk) 32.750 (Network)	1 (RW) 1 (TW)	3 (3.985)
Piketberg	Berg River Voëlvlei Spring	3.150	19.400 (Bulk) 54.130 (Network)	1 (RW) 4 (TW)	2 (5.700)
Wittewater	Mountain Stream Fountain Two Boreholes	Unknown	0.546 (Bulk) 6.640 (Network)	1 (RW) 1 (TW)	4 (0.500)
Goedverwacht	Riet River	Unknown	1.839 (Bulk) 14.570 (Network)	1 (RW)	4 (0.626)
Velddrif	Withoogte Bulk Scheme (WCDM)	-	87.325 (Network)	1 (TW)	5 (10.500)
Dwarskersbos	Withoogte Bulk Scheme (WCDM)	-	15.605 (Network)	1 (TW)	3 (1.128)
Aurora	Five Boreholes	0.200	2.633 (Bulk) 12.945 (Network)	1 (TW)	2 (0.550)
Eendekuil	Waboomfontein River and Spring Borehole	0.200	13.436 (Bulk) 7.180 (Network)	-	1 (0.400)
Redelinghuys	Matroosfontein Springs	0.260	3.208 (Bulk) 8.515 (Network)	1 (RW) 1 (TW)	2 (0.440)

The table below gives an overview of the major **sewerage infrastructure** components, for the various drainage systems, in Bergrivier Municipality's Management Area.

Table A.3.2: Summary of existing main sewerage infrastructure

Sewer Drainage Systems	Sewer Drainage Network (km)	Number of Sewer PS	WWTW (Capacity in Ml/d)
Porterville	Gravity 28.1	1	New Activated Sludge WWTW under construction (1.500)
Piketberg	Gravity 45.9; Rising 0.9	2	Activated Sludge (3.150)
Wittewater	-	-	-
Goedverwacht	-	-	-
Velddrif	Gravity 34.0; Rising 15.5	48	Activated Sludge (1.995)
Dwarskersbos	Gravity 6.3; Rising 5.2	5	Oxidation Ponds (0.294)
Aurora	-	-	-
Eendekuil	Gravity 2.4; Rising 1.5	2	Oxidation Ponds (0.140)
Redelinghuys	-	-	-

Following the 2011 Census survey, it became evident that there was an extensive migration into the Municipal Area. The estimated population figure for Bergrivier Municipality in 2001 was 46 327. This figure increased substantially to 61 898 in 2011.

The water services levels of the respective settlements are illustrated in the context of its adequacy (as per WSDP Guide Framework definitions), and further summarised in Section C.2 of this Water Services Audit Report. Due to its categorization in terms of adequacy, a single settlement may be categorized in terms of more than one adequacy definition (example a portion of the households may receive adequate services whilst the remainder may have a specific infrastructure 'upgrade' or 'refurbishment' need).

The current population figures and the annual population growth percentages used in the WSDP Performance- and Water Services Audit Report are aligned with the figures used in DWS's GeoDatabase. The future estimated annual population growth percentages, as listed in the table below, were agreed with the Civil Services and Community Services Departments during January 2014.

Table A.3.3: Estimated future annual population growth percentages per distribution system

Distribution System	Estimated future annual Population Growth %
Porterville	1.5%
Piketberg	2.0%
Wittewater	0.5%
Goedverwacht	2.0%
Velddrif	5.0%
Dwarskersbos	3.5%
Aurora	1.0%
Eendekuil	2.0%
Redelinghuys	0.5%
Farms	1.5%
Total	**2.3%**

The Community Survey of 2016 from Statistics South Africa estimate the 2016 population for Bergrivier Municipality at 67 474 persons and the permanent households at 19 072, at an average household size of 3.5 persons per household.

Bergrivier Municipality's 4th Generation IDP 2017-2022, Review 1 2018/19, estimated the total population to grow from 68 751 in 2018 to 73 232 in 2023. This equates to growth of 6.5% across the period; or at an average annual rate of 1.3%.

The tables below give an overview of the projected population and permanent number of households and the water and sanitation service levels in Bergrivier Municipality's Management Area.

Table A.3.4: Water Services Overview (Water)

Settlement Type	2011/2012 Households	2011/2012 Population	2017/2018 Households	2017/2018 Population	Water category: Adequate: Formal	Adequate: Informal	Adequate: Sahred Services	Water resources needs only	O&M needs only	Infrastructure needs only	Infrastructure & O&M needs	Infrastructure, O&M & Resource need	No Services: Informal	No Services: Formal
URBAN														
Metropolitan Area					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Formal Town					Adequate			Below RDP					None	
Porterville	1,949	7,057	2,131	7,716	P		P							
Piketberg	2,920	12,075	3,288	13,598	P		P							
Wittewater	190	848	196	874	P		P							
Goedverwacht	539	1,979	607	2,229	P		P							
Velddrif	3,622	10,677	4,854	14,764	P		P							
Dwarskersbos	211	670	259	824	P		P							
Aurora	199	578	211	614	P		P							
Eendekuil	379	1,530	427	1,723	P		P							
Redelinghuys	139	574	143	591	P		P							
Sub-Total	**10,148**	**35,988**	**12,117**	**42,933**										
Townships					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Informal Settlements					Adequate			Below RDP					None	
Velddrif	85	340	0	0										
Sub-Total	**85**	**340**	**0**	**0**										
Working towns & service centres					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Sub-Total: (Urban)	**10,233**	**36,328**	**12,117**	**42,933**										
RURAL														
Rural / Farming					Adequate			Below RDP					None	
Farms	6,162	25,570	6,738	27,959	P		P							P
Sub-Total	**6,162**	**25,570**	**6,738**	**27,959**										
Informal Settlements					Adequate			Below RDP					None	
Sub-Total	**0**	**0**	**0**	**0**										
Sub-Total (Rural)	**6,162**	**25,570**	**6,738**	**27,959**										
TOTAL	**16,395**	**61,898**	**18,855**	**70,892**										

Table A.3.5: Water Services Overview (Sanitation)

Settlement Type	2011/2012 Households	2011/2012 Population	2017/2018 Households	2017/2018 Population	Sanitation category: Adequate: Formal	Adequate: Informal	Adequate: Sahred Services	Water resources needs only	O&M needs only	Infrastructure needs only	Infrastructure & O&M needs	Infrastructure, O&M & Resource need	No Services: Informal	No Services: Formal
URBAN														
Metropolitan Area					**Adequate**			**Below RDP**						**None**
Sub-Total	**0**	**0**	**0**	**0**										
Formal Town					**Adequate**			**Below RDP**						**None**
Porterville	1,949	7,057	2,131	7,716	P		P							
Piketberg	2,920	12,075	3,288	13,598	P		P							
Wittewater	190	848	196	874	P		P							
Goedverwacht	539	1,979	607	2,229	P		P							
Velddrif	3,622	10,677	4,854	14,764	P		P							
Dwarskersbos	211	670	259	824	P		P							
Aurora	199	578	211	614	P		P							
Eendekuil	379	1,530	427	1,723	P		P							
Redelinghuys	139	574	143	591	P		P							
Sub-Total	**10,148**	**35,988**	**12,117**	**42,933**										
Townships					**Adequate**			**Below RDP**						**None**
Sub-Total	**0**	**0**	**0**	**0**										
Informal Settlements					**Adequate**			**Below RDP**						**None**
Velddrif	85	340	0	0										
Sub-Total	**85**	**340**	**0**	**0**										
Working towns & service centres					**Adequate**			**Below RDP**						**None**
Sub-Total	**0**	**0**	**0**	**0**										
Sub-Total: (Urban)	**10,233**	**36,328**	**12,117**	**42,933**										
RURAL														
Rural / Farming					**Adequate**			**Below RDP**						**None**
Farms	6,162	25,570	6,738	27,959	P		P							P
Sub-Total	**6,162**	**25,570**	**6,738**	**27,959**										
Informal Settlements					**Adequate**			**Below RDP**						**None**
Sub-Total	**0**	**0**	**0**	**0**										
Sub-Total (Rural)	**6,162**	**25,570**	**6,738**	**27,959**										
TOTAL	**16,395**	**61,898**	**18,855**	**70,892**										

B. WSDP PERFORMANCE REPORT

B.1. WSDP Reference and Status

Bergrivier Municipality's WSDP was updated according to the DWS's 2014 WSDP format and was approved by Council on the 25th of October 2016 (2017-2022 WSDP First Cycle).

Table B.1.1: WSDP and Reporting Reference

Nr	WSDP Title and Reference	Status	Date	WSDP Year	Financial Year	Reporting year
1	WSDP IDP Sector Input Report, eWSDP, Module 2: Base Data and Compliance Data and Module 3: Strategies	Drafted:	Jul'16	Year 1	2016/17	Year - 2
		Comment submit:	After Oct'16	Year 2	**2017/18**	Year - 1
		Finalised:	After Comments	Year 3	2018/19	Year 0
		Adopted:	25/10/2016	Year 4	2019/20	Year 1
		Published:	25/10/2016	**Year 5**	2020/21	Year 2

Legend:

- Past Financial Years
- Previous Financial Year (financial year of reporting)
- Future Years

B.2. Performance on Water Services Objectives and Strategies

The IDP is the Municipality's single most strategic document that drives and directs all implementation and related processes. The Municipality's budget is developed based on the priorities, programmes and projects of the IDP, after which a Service Delivery Budget Implementation Plan (SDBIP) is developed, to ensure that the organisation actually delivers on the IDP targets.

The SDBIP is the process plan and performance indicator / evaluation for the execution of the budget. The SDBIP is being used as a management, implementation and monitoring tool that assists and guide the Executive Mayor, Councillors, Municipal Manager, Senior Managers and the community. The plan serves as an input to the performance agreements of the Municipal Manager and Directors. It also forms the basis for the monthly, quarterly, mid-year and the annual assessment report and performance assessments of the Municipal Manager and Directors.

Finally, the Annual Report, of which the Water Services Audit Report forms a part, records the success or otherwise of the previous year's implementation.

The table below gives an overview of the Municipality's performance on the water and sanitation objectives and strategies per WSDP topic, as taken from the SDBIP.

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic

Nr	Objective / Strategy	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		WSDP Year 5	
					FY 1	2013/14	FY 2	2014/15	FY 3	2015/16	FY 4	2016/17	FY 5	2017/18
			WSDP	IDP	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
WSDP Topic 1: Administration														
D249, D266, D288, D443, D457	Compilation of monthly report in prescribed format	Number of monthly reports submitted to Technical Committee	No	Yes							12	12	12	12
WSDP Topic 2: Demographics														
WSDP Topic 3: Service levels														
WSDP Topic 4: Socio economic														
D250	Reports on EPWP Grant	Number of Reports	No	Yes									1	1
D251	Reports on FTE achieved	FTE achieved	No	Yes									41	72
D252	Number EPWP jobs created	Jobs created	No	Yes									132	455
D335	Create full time equivalents (FTE's) ito EPWP programme by 30 June	Number of FTE's created by 30 June	Yes	Yes			36	35	36	110	36	83	36	91
WSDP Topic 5: Water Services Infrastructure														
D322	95% of MIG funding allocated for the financial year to build a new WWTW in Porterville by 30 June 2018	% of MIG funding allocated for the financial year to build a new WWTW in Porterville by 30 June 2018	Yes	Yes							95%	409%	95%	100%
D253	Construction of WWTW in Porterville	% Capital budget spent	Yes	Yes									95%	100%
D246, D263, D285, D437, D453	Report the acquisition of new assets that must be taken up in the asset register to SCM Unit	% of assets registered within one month of receipt of asset	Yes	Yes			100%	100%	100%	100%	100%	100%	100%	100%
D445	New water standby pumps	% Capital budget spent	No	Yes							100%	88%	0%	100%
D275, D299	Telemetry - Water	% Capital budget spent	No	Yes							100%	0%	0%	0%
D272	Capital Switchgear and pumps - Velddrif	% Capital budget spent	No	Yes			95%	100%	95%	95%	100%	60%	0%	0%
D276	Sewerage standby pumps	% Capital budget spent	No	Yes							100%	100%	0%	0%
D277	Replace water meters	% Capital budget spent	No	Yes							100%	100%	0%	0%
D271	Purchase new borehole pumps	% Capital budget spent	No	Yes							100%	100%	0%	0%
WSDP Topic 6: Operation Maintenance														
WSDP Topic 7: Associated services														
WSDP Topic 8: Conservation and Demand management														
D321	Limit unaccounted for water to 10% by 30 June	% unaccounted water by 30 June	Yes	Yes			10%	8.88%	10%	10.53%	10%	9.93%	10%	6.98%
D330	Research the development of a strategy for innovative methods to manage droughts and water supply and submit research paper to EMC by 30 June 2018.	Paper submitted	No	Yes									1	1
D441	Monitor water losses on a monthly basis	No of monthly reports on water losses	Yes	Yes			1	1	12	12	12	12	12	12
D270, D292, D462	Repair / replace faulty water meters on list received from Finance within 2 working days	% meters repaired within 5 working days (Subject to availability of material from suppliers)	No	Yes			100%	100%	100%	100%	100%	100%	100%	100%
D302, D466	Replace redundant meters	% capital budget spent	No	Yes							100%	100%	0%	0%

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic

Nr	Objective / Strategy	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		WSDP Year 5	
					FY 1	2013/14	FY 2	2014/15	FY 3	2015/16	FY 4	2016/17	FY 5	2017/18
			WSDP	IDP	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
WSDP Topic 9: Water Resources														
D261, D283, D440, D451	Monitor potable water quaility (SANS 241 standards) in perusal of blue drop requirements	No of monthly reports on water quality results and publication thereof on website within 10 days after month end	Yes	Yes			100%	100%	12	12	12	12	12	12
D260, D282, D439, D450	Monitor waste water quality in perusal of green drop requirements	No of monthly reports on waste water quality results and publication thereof on website within 10 days after month end	Yes	Yes			100%	100%	12	12	12	12	12	12
D328	95% water quality level obtained as per SANS 241 physical & micro parameters as at 31 December 2017 and 30 June 2018	% water quality level as at 31 December 2017 and 30 June 2018	Yes	Yes							95%	96%	95%	98%
WSDP Topic 10: Financial profile														
D324	95% of MIG conditional grant spent by 30 June 2018 to upgrade infrastructure	% of MIG conditional grant spent by 30 June 2018	Yes	Yes			100%	93.00%	100%	99%	95%	105%	95%	100%
WSDP Topic 11: Institutional Arrangements profile														
D244, D435	Monitor performance of all long term service providers and take the necessary actions to improve performance on a quarterly basis	Number of Service Provider Performance Reports	No	Yes			4	4	4	4	4	4	4	4
D247, D264, D286, D438, D454	Cost effective and productive management of personnel	Number of monthly meetings held with subordinates	No	Yes			1	1	12	12	12	12	12	12
D265, D287, D456	Availability of standby personnel 24 hours per day according to standby list	% Of standby personnel available	No	Yes			100%	100.00%	100%	100%	100%	100%	100%	100%
WSDP Topic 12: Social and Customer service requirements														
D243, D262, D284, D434, D452	Improve complaint management by ensuring all compliants registered on the IMIS system are addressed within the required time frames.	% of complaints addressed or responded to within required timeframe.	No	Yes			100%	100%	100%	100%	100%	100%	100%	100%
WSDP Topic 13: Needs development plan														

Legend:

	Past Financial Years
	Previous Financial Year (financial year of reporting)
	Future Years

The following water and sanitation related investigations were successfully completed during the last financial year.

- The WSDP Performance- and Water Services Audit Report for the 2016/2017 financial year was finalised and approved by Council as part of the Annual Report. The NRW water balance models were updated for each of the distribution systems (Up to the end of June 2017) as part of the Water Services Audit Process.

- Bergrivier Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). Sample results are loaded on a monthly basis onto DWS's IRIS and GDS. All the WTWs and WWTWs are registered on the IRIS and GDS websites.

- The Asset Register was updated to include all the water and sewerage capital projects completed during the 2017/2018 financial year.

- A MIG Technical Report for the upgrading of the St Christopher Sewer Pump Station and Rising Main in Velddrif was compiled. A MIG Technical Report for the Upgrading of the Bulk Sewer for Monte Bertha in Porterville was also compiled.

- Detail WWTW Process Audits were completed for all the WWTWs.

The following awards / acknowledgements were also received by the Municipality:

- The Municipality's overall Blue Drop score came down from 90.60% for 2012 to 63.79% for 2014. The highest blue drop score was 72.93% for Porterville and the lowest blue drop score was 49.29% for Eendekuil. The DWS mentioned that Bergrivier Municipality was well prepared for the assessment and demonstrated a positive approach to the Blue Drop Certification Programme. Consequently, it is anticipated that through acknowledgement of the identified gaps that progressive improvement in compliance will once again be achieved in future assessments.

  The overall 2014 Risk Rating for Bergrivier Municipality is 52%. This risk value is based on Process Control RR, Drinking Water Quality RR and Risk Management RR, with scores above 50% (medium to critical risks) for Process Control in 4 of the 6 systems and Drinking Water Quality in 3 of the 6 systems.

- The overall Green Drop Score of the Municipality came down from 70.00% in 2011 to 44.21% in 2013 and was performing below average with regard to wastewater quality management. The highest Green Drop Score of 62.60% was for the Porterville WWTW and drainage system and the lowest Green Drop Score of 24.23% was for the Eendekuil WWTW and drainage system. The Green Water Services Audit revealed substantial shortcomings in the areas of risk- and asset management, as well as effluent quality.

  The CRRs decreased in two of the systems (Dwarskersbos and Eendekuil) and stayed roughly the same for Piketberg, Porterville and Velddrif during the 2013/2014 Green Drop Progress Reporting in 2014. Upgrades to the system have been made, resulting in improved compliance at most plants. However, the Velddrif and Eendekuil plants are not meeting standards. A W_2RAP is in place and are being implemented to ensure that high-risk areas are abated. Flows are monitored at each site, with the exception of Dwarskersbos, which receive low flow to the pond system. All indicators are that Bergrivier is showing PROGRESS against the CRR rating over the 2011 to 2012 assessment year. The team is congratulated for their preparedness and positive contribution to the PAT assessments.

- Bergrivier Municipality achieved 100% expenditure in the 2017/2018 financial year on their MIG (DLG) funding received.

B.3. Status of Water Services Projects

Bergrivier Municipality completed the following water and sewerage capital projects during the last financial year.

Table B3.1: Water Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Year 0 Performance - FY2017/18			Funding Source(s)	Project Category / Type	Planned Period		Project Status	Actual Completion Year
		WSDP	IDP		FY Budget R'000	Expended R'000	%			From FY	To FY		
1	Pumps (standby)	Yes	Yes	R1,458	R200	R12	6%	CR	Water Distribution	2014/2015	2020/2021	In progress	-
2	Pipeline Replacement Programme	No	Yes	R799	R76	R99	130%	CR	Water Distribution	2017/2018	2020/2021	In progress	-
3	WC/WDM intervention	No	Yes	R6,414	R1,750	R1,254	72%	CR	Water Distribution	2017/2018	2020/2021	In progress	-
4	Replace water meters	Yes	Yes	R1,019	R120	R71	59%	CR	Water Distribution	2011/2012	2020/2021	In progress	-
5	Replace redundant meters	Yes	Yes	R952	R120	R115	96%	CR	Water Distribution	2015/2016	2020/2021	In progress	-
6	Water Renewals	Yes	Yes	R259	R50	R49	99%	CR	Water Distribution	2016/2017	2020/2021	In progress	-
7	Furniture and Equipment - Water	Yes	Yes	R47	R9	R8	90%	CR	Water Distribution	2011/2012	2017/2018	Completed	2018
8	Tools	Yes	Yes	R120	R25	R21	82%	CR	Water Distribution	2011/2012	2017/2018	Completed	2018
9	Purchase new borehole pumps	Yes	Yes	R283	R46	R40	88%	CR	Water Distribution	2012/2013	2019/2020	In progress	-
10	Water meter at source	No	Yes	R109	R75	R74	99%	CR	Water Distribution	2014/2015	2017/2018	Completed	2018
11	Telemetery: Water	Yes	Yes	R436	R96	R96	100%	CR	Water Distribution	2016/2017	2019/2020	In progress	-
12	WC/WDM intervention	No	Yes	R5,160	R1,050	R0	0%	EL	Water Distribution	2017/2018	2020/2021	In progress	-
13	Sewer Renewals	Yes	Yes	R279	R38	R17	45%	CR	Sewerage	2016/2017	2020/2021	In progress	-
14	Telemetry	Yes	Yes	R600	R110	R109	99%	CR	Sewerage	2015/2016	2020/2021	In progress	-
15	Switchgear and pumps	Yes	Yes	R1,097	R120	R118	99%	CR	Sewerage	2011/2012	2020/2021	In progress	-
16	Telemetry at pump stations	Yes	Yes	R962	R150	R147	98%	CR	Sewerage	2011/2012	2020/2021	In progress	-
17	Sewerage stand by pumps	Yes	Yes	R781	R176	R12	7%	CR	Sewerage	2011/2012	2020/2021	In progress	-
18	Replace rising mains in pump stations	No	Yes	R650	R100	R100	100%	CR	Sewerage	2017/2018	2020/2021	In progress	-
19	Furniture Equipment - Sewerage	Yes	Yes	R56	R8	R8	95%	CR	Sewerage	2011/2012	2017/2018	Completed	2018
20	Tools	Yes	Yes	R73	R20	R19	96%	CR	Sewerage	2011/2012	2017/2018	Completed	2018
21	Basket screens for pumpstations	Yes	Yes	R97	R47	R47	100%	CR	Waste Water Treatment	2016/2017	2017/2018	Completed	2018
22	Chlorine dossing pump	No	Yes	R37	R38	R37	100%	CR	Waste Water Treatment	2017/2018	2017/2018	Completed	2018
23	Furniture Equipment - Stormwater Management	No	Yes	R10	R5	R5	97%	CR	Waste Water Treatment	2016/2017	2017/2018	Completed	2018
24	Low water bridge: Park Street	No	Yes	R11	R10	R1	10%	CR	Waste Water Treatment	2016/2017	2017/2018	Completed	2018
25	Stabilise Wintervoor (Flood prevention)	No	Yes	R55	R35	R29	82%	CR	Waste Water Treatment	2016/2017	2017/2018	Completed	2018
26	Construction of stormwater channels at low cost houses	No	Yes	R471	R275	R299	109%	CR	Waste Water Treatment	2015/2016	2017/2018	Completed	2018
27	Refurbishment and upgrade of WWTW	Yes	Yes	R22,992	R12,317	R12,317	100%	MIG	Waste Water Treatment	2016/2017	2018/2019	In progress	-
	Total			**R28,171**	**R17,065**	**R15,104**	**89%**						

B.4. Past Financial Year Water Services Projects Impact Declaration

The impacts of the water and sewerage capital projects, which were implemented by Bergrivier Municipality in the previous financial year, were as follows:

Table B.4.1: Past Financial Year Project Impact Declaration

Nr	Project Title and Description	Project Category	Settlements which benefitted	Nr Beneficiaries		Impact Declaration
				Households	Population	
1	Pumps (Standby)	Water Pump Stations	Management Area	-	-	Ensure adequate water supply and pressure.
2	Pipeline Replacement Programme	Reticulation	Management Area	-	-	Reduce water leakages and increase security of supply. Implementation of Pipeline Replacement Programme
3	WC/WDM intervention	WC/WDM	Management Area	-	-	Reduce NRW and Water Losses
4	Replace water meters	WC/WDM	Management Area	-	-	Reduce NRW and Water Losses
5	Replace redundant meters	WC/WDM	Management Area	-	-	Reduce NRW and Water Losses
6	Water Renewals	Other	Management Area	-	-	Ensure adequate operation and maintenance of existing water infrastructure
7	Furniture Equipment - Water	Other	Management Area	-	-	-
8	Tools	Other	Management Area	-	-	Ensure adequate operation and maintenance of existing water infrastructure
9	Purchase new borehole pumps	Source	Aurora	211	614	Ensure sustainability of groundwater resources
10	Water meter at source	WC/WDM	Management Area	-	-	Monitoring of water supply volume and water losses
11	Telemetry Water	WC/WDM	Management Area	-	-	Monitoring of water levels and water usage
12	WC/WDM	WC/WDM	Management Area	-	-	-
13	Sewer Renewals	Other	Management Area	-	-	Ensure adequate operation and maintenance of existing sewerage infrastructure
14	Telemetry	Other	Management Area	-	-	Monitoring of sewer pump stations and WWTW flows
15	Switchgear and pumps	Sewer Pump Stations	Management Area	-	-	Ensure adequate pump capacity, in order to prevent any possible spillages.
16	Telemetry at pump stations	Sewer Pump Stations	Management Area	-	-	Monitoring of sewer pump stations
17	Sewerage standby pumps	Sewer Pump Stations	Management Area	-	-	Ensure adequate pump capacity, in order to prevent any possible spillages.
18	Replace rising mains in pump stations	Sewer Pump Stations	Management Area	-	-	Ensure adequate rising main capacity
19	Furniture Equipment - Sewerage	Other	Management Area	-	-	-
20	Tools	Other	Management Area	-	-	Ensure adequate operation and maintenance of existing sewerage infrastructure
21	Basket screens for pump stations	Sewer Pump Stations	Management Area	-	-	Basket screens for sewer pump stations, in order to prevent blockages and possible spillages.
22	Chlorine dosing pump	WWTW	Management Area	-	-	Ensure adequate disinfection of final treated effluent (Microbiological compliance)
23	Furniture Equipment - Stormwater Management	Other	Management Area	-	-	-
24	Lower water bridge: Park Street	Other	Management Area	-	-	-
25	Stabilise Wintervoor (Flood prevention)	Other	Management Area	-	-	Flood prevention
26	Construction of storm water channels at low cost houses	Other	Management Area	-	-	Stormwater Management at low cost houses
27	Refurbishment and upgrade of WWTW	WWTW	Porterville	2131	7716	Increase treatment capacity and ensure compliance with final effluent quality
TOTAL				**2342**	**8330**	

C. WATER SERVICES AUDIT REPORT

C.1. Quantity of Water Services Provided (Water Balance)

The graph below gives an overview of the total bulk water supply for the various distribution systems in Bergrivier Municipality's Management Area.

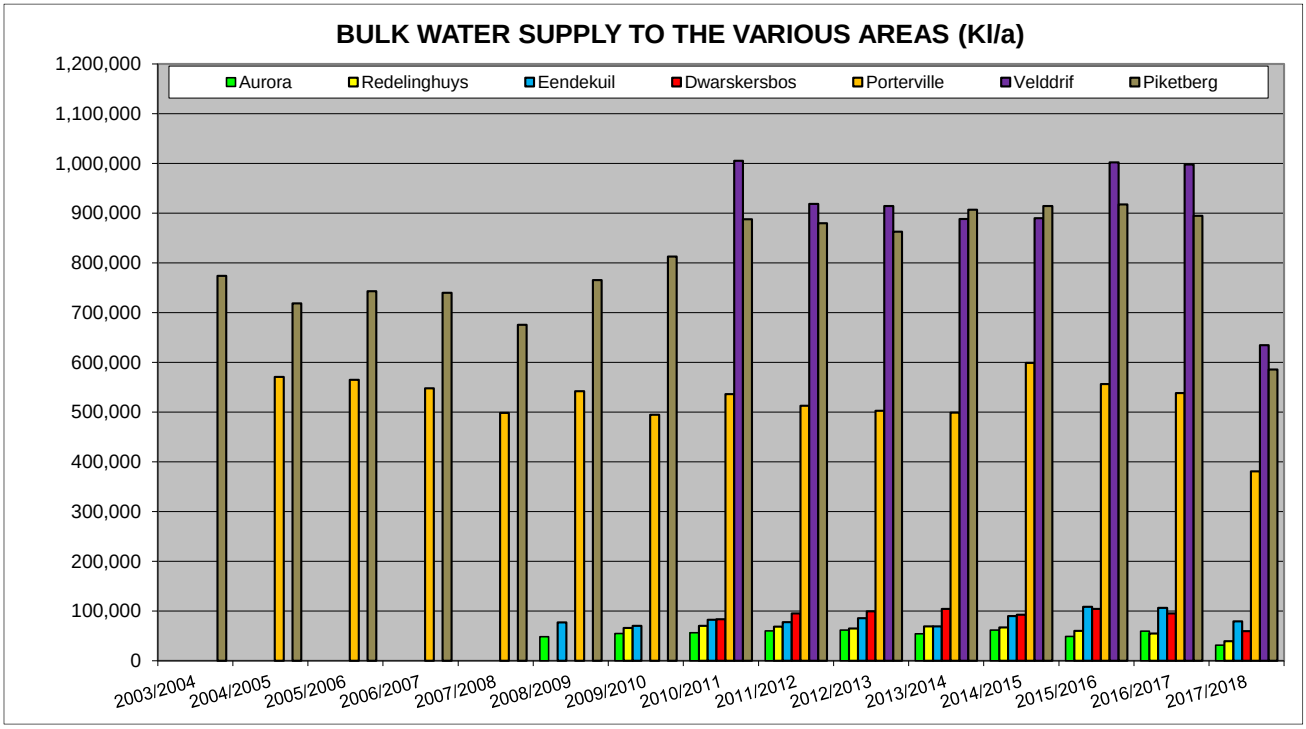


Figure C.1.1: Bulk water supply for the various distribution systems

Table C.1.1: Bulk water supply to the various towns

Distribution System	Source	17/18	Record : Prior (Ml/a)				
			16/17	15/16	14/15	13/14	12/13
Porterville	Voorberg Mountain Stream and two Fountains	380.720	538.254	556.439	599.181	499.063	502.797
Piketberg	Berg River and Voëlvlei Spring	585.587	894.559	917.655	914.605	907.156	863.083
Velddrif	Withoogte Scheme (Berg River)	634.758	997.973	1 002.042	889.858	888.237	914.335
Dwarskersbos	Withoogte Scheme (Berg River)	59.366	94.801	104.231	92.183	104.298	99.369
Aurora	Boreholes	31.380	59.354	48.854	61.633	54.077	61.657
Eendekuil	Waboomfontein Spring and Borehole	79.036	105.960	108.337	89.850	69.057	85.511
Redelinghuys	Matroosfontein Spring	39.282	54.683	60.108	66.669	68.806	64.919
Total		**1 810.129**	**2 745.584**	**2 797.666**	**2 713.979**	**2 590.693**	**2 591.671**

Notes for bulk water supply volume:

Porterville and Piketberg - System Input Volume plus 7.5% losses for treatment and bulk distribution

Redelinghuys and Eendekuil - System Input Volume plus 10.0% losses for treatment and bulk distribution

The table below gives an overview of the quantity of water services provided / water balance for all the distribution systems in Bergrivier Municipality's Management Area.

Table C.1.2: Quantity of Water Services Provided / Water Balance								
WSDP Ref. #	Regulations Ref. #	Description	m^3 per annum			Ml/d		
			Year 0	Year - 1	Year - 2	Year 0	Year - 1	Year - 2
			FY2017/18	FY2016/17	FY2015/16	FY2017/18	FY2016/17	FY2015/16
		RAW WATER						
7.2.1		Surface water purchased	0	0	0	0.00	0.00	0.00
7.1 / 7.2.2		Surface water abstracted	1,778,749	2,686,230	2,748,812	4.87	7.36	7.53
7.1 / 7.2.3		Ground water abstracted	31,380	59,354	48,854	0.09	0.16	0.13
7.2.14		Effluent recycled	0	0	0	0.00	0.00	0.00
7.2.4		*less* Raw water supplied to others	0	0	0	0.00	0.00	0.00
7.2.5		**Sub-Total: Raw Water supplie**	**1,810,129**	**2,745,584**	**2,797,666**	**4.96**	**7.52**	**7.66**
	10.2 (g) (i)	**BULK WATER SUPPLY**						
7.2.6		Volume of water treated	1,016,374	1,519,765	1,553,092	2.78	4.16	4.26
7.2.7	10.2 (a) (ii)	Purchased treated water	694,124	1,092,774	1,106,273	1.90	2.99	3.03
7.2.7A		Ground water not treated	0	0	0	0.00	0.00	0.00
7.2.6A		*less* Treated water supplied to others	0	0	0	0.00	0.00	0.00
		Sub-Total: System Input Volume	**1,710,498**	**2,612,539**	**2,659,365**	**4.69**	**7.16**	**7.29**
		WATER CONSUMPTION						
7.2.8.1		Billed Metered:	1,595,585	2,327,843	2,336,721	4.37	6.38	6.40
	10.2 (a) (i)	Domestic	1,380,641	1,920,677	1,920,620	3.78	5.26	5.26
	10.2 (a) (i)	Commercial						
	10.2 (a) (i)	Industrial	38,453	46,200	52,301	0.11	0.13	0.14
	10.2 (a) (i)	Municipal, Others & Farms	176,491	360,966	363,800	0.48	0.99	1.00
7.2.8.2		Billed Unmetered	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	Domestic	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	Commercial	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	Industrial	0	0	0	0.00	0.00	0.00
	10.2 (a) (i)	Municipal, Others & Farms	0	0	0	0.00	0.00	0.00
7.2.8.3		Unbilled Metered	0	0	0	0.00	0.00	0.00
7.2.8.4		Unbilled Unmetered	3,421	5,225	5,319	0.01	0.01	0.01
	10.2 (g) (i)	**Sub-Total: Authorized consumption**	**1,599,006**	**2,333,068**	**2,342,040**	**4.38**	**6.39**	**6.42**
		UNACCOUNTED FOR WATER						
7.3.1		Raw water bulk loss	99,631	133,045	138,301	0.27	0.36	0.38
7.2.3/7.2.4		Billing losses	3,421	5,225	5,319	0.01	0.01	0.01
7.2.5		Apparent losses	14,494	36,331	41,252	0.04	0.10	0.11
7.2.5.1		Illegal connections	2,230	5,589	6,347	0.01	0.02	0.02
7.2.5.2		Inaccurate meters	11,149	27,947	31,733	0.03	0.08	0.09
7.2.5.3		Data errors	1,115	2,795	3,173	0.00	0.01	0.01
7.2.6		Real losses	96,998	243,140	276,073	0.27	0.67	0.76
	10.2 (g) (ii)	**Sub-Total: Unaccounted for water**	**111,492**	**279,471**	**317,325**	**0.31**	**0.77**	**0.87**
		WASTEWATER TREATMENT						
7.2.9	10.2 (a) (iii)	Total received at WWTW	1,263,684	1,485,234	1,460,230	3.46	4.07	4.00
7.2.11		Total discharged	1,047,122	1,226,403	1,179,382	2.87	3.36	3.23
7.2.13		Returned to environment	684,053	803,668	752,676	1.87	2.20	2.06
7.2.14		Recycled	363,069	422,735	426,706	0.99	1.16	1.17
	10.2 (a) (iv)	**Quantity of water supplied not discharged to WWTWs**	**335,322**	**847,834**	**881,810**	**0.92**	**2.32**	**2.42**

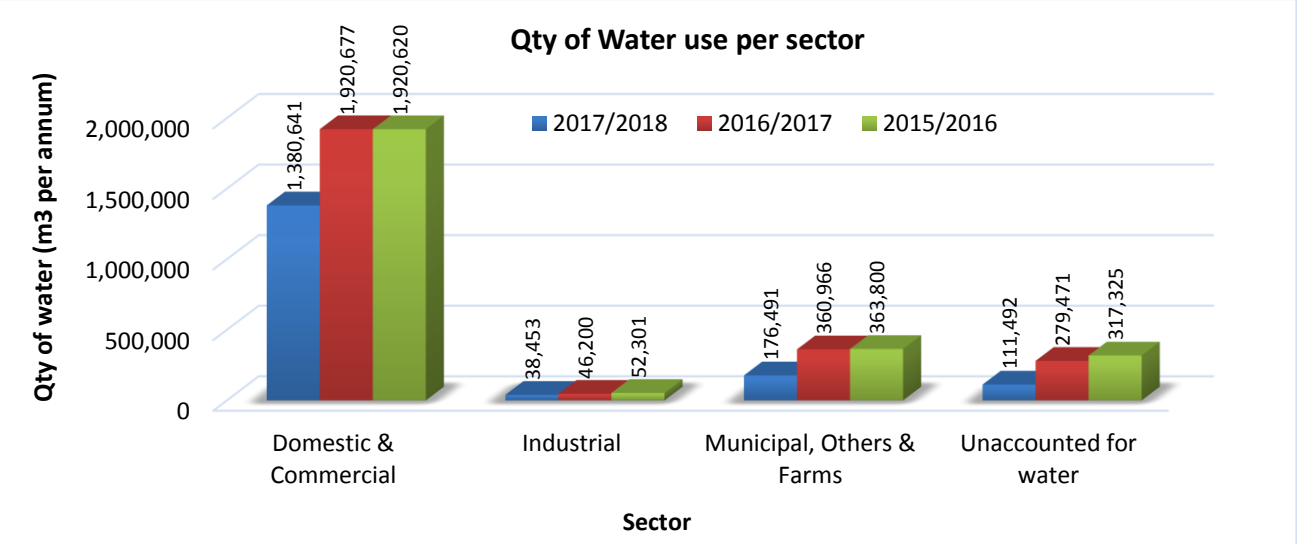


Figure C.1.2: Quantity of water services provided / water balance

Graphs of the water usage per sector for the various distribution systems within Bergrivier Municipality's Management Area are included as part of the water balance models in Annexure A. The table below gives a summary of the information (Billed Metered Consumption).

Table C.1.3: Quantity of water used by each user sector (Ml/a)

Town	Year	Residential & Commercial	Industrial	Municipal	Other	Farms	Total
Porterville	10/11	350.457	0.000	48.111	27.945	0.000	426.513
	11/12	343.145	0.000	29.762	23.551	0.000	396.458
	12/13	348.739	0.000	35.899	23.090	0.000	407.728
	13/14	344.642	0.000	34.259	18.544	0.000	397.445
	14/15	369.694	0.000	47.415	14.393	0.000	431.502
	15/16	344.709	0.000	50.295	22.311	0.000	417.315
	16/17	336.796	0.000	42.003	21.785	0.000	400.584
	17/18	288.529	0.000	28.666	16.267	0.000	333.462
Piketberg	10/11	556.872	46.645	77.427	27.713	33.740	742.397
	11/12	529.574	46.091	36.341	27.356	16.383	655.745
	12/13	535.191	52.164	36.869	23.713	12.834	660.771
	13/14	537.741	59.737	40.672	24.841	4.190	667.181
	14/15	576.465	66.681	92.816	30.724	3.368	770.054
	15/16	549.345	51.974	116.572	29.556	23.152	770.599
	16/17	515.156	45.827	96.779	30.060	44.632	732.454
	17/18	361.223	38.114	16.707	25.805	37.738	479.587
Velddrif	10/11	732.709	0.000	88.182	2.651	0.000	823.542
	11/12	771.785	0.000	77.721	3.332	0.000	852.838
	12/13	734.087	0.000	93.591	3.904	0.000	831.582
	13/14	712.122	0.000	90.847	4.358	0.000	807.327
	14/15	653.515	0.000	71.219	6.577	0.000	731.311
	15/16	816.634	0.000	71.283	10.271	0.000	898.188
	16/17	866.968	0.000	71.051	15.339	0.000	953.358
	17/18	598.415	0.000	21.512	9.647	0.000	629.574
Dwarskersbos	10/11	73.205	0.000	2.693	0.000	0.000	75.898
	11/12	86.991	0.000	2.973	0.000	0.000	89.964
	12/13	78.524	0.000	3.464	0.000	0.000	81.988
	13/14	93.539	0.000	2.953	0.000	0.000	96.492

Table C.1.3: Quantity of water used by each user sector (Ml/a)							
Town	**Year**	**Residential & Commercial**	**Industrial**	**Municipal**	**Other**	**Farms**	**Total**
	14/15	89.800	0.000	2.456	0.000	0.000	92.256
	15/16	93.713	0.000	5.658	0.000	0.000	99.371
	16/17	88.454	0.000	6.175	0.000	0.000	94.629
	17/18	50.440	0.000	2.959	0.000	0.039	53.438
Aurora	10/11	33.858	0.000	12.620	0.000	0.000	46.478
	11/12	33.797	0.000	11.796	0.000	0.000	45.593
	12/13	33.606	0.000	6.500	0.000	0.000	40.106
	13/14	31.227	0.000	5.880	0.000	0.000	37.107
	14/15	37.690	0.000	7.268	0.000	0.000	44.958
	15/16	38.065	0.000	7.631	0.000	0.000	45.696
	16/17	32.060	0.000	8.688	0.000	0.000	40.748
	17/18	23.124	0.000	0.372	0.000	0.000	23.496
Eendekuil	10/11	48.095	0.449	2.120	2.223	21.222	74.109
	11/12	45.515	0.261	2.321	1.524	19.977	69.598
	12/13	43.612	0.314	1.966	2.572	21.463	69.927
	13/14	44.863	0.271	2.043	2.107	20.319	69.603
	14/15	45.796	0.273	1.201	4.228	16.783	68.281
	15/16	49.237	0.327	1.459	4.132	16.053	71.208
	16/17	50.401	0.373	2.294	1.893	12.953	67.914
	17/18	36.169	0.339	0.796	1.631	9.974	48.909
Redelinghuys	10/11	33.419	0.000	0.000	10.088	0.000	43.507
	11/12	30.244	0.000	0.000	6.589	0.000	36.833
	12/13	28.967	0.000	0.000	6.146	0.000	35.113
	13/14	31.122	0.000	0.000	6.272	0.000	37.394
	14/15	32.513	0.000	0.055	5.517	0.000	38.085
	15/16	28.917	0.000	0.157	5.270	0.000	34.344
	16/17	30.842	0.000	0.191	7.123	0.000	38.156
	17/18	22.741	0.000	0.182	4.196	0.000	27.119
TOTAL	**10/11**	**1 828.615**	**47.094**	**231.153**	**70.620**	**54.962**	**2 232.444**
	11/12	**1 841.051**	**46.352**	**160.914**	**62.352**	**36.360**	**2 147.029**
	12/13	**1 802.726**	**52.478**	**178.289**	**59.425**	**34.297**	**2 127.215**
	13/14	**1 795.256**	**60.008**	**176.654**	**56.122**	**24.509**	**2 112.549**
	14/15	**1 805.473**	**66.954**	**222.430**	**61.439**	**20.151**	**2 176.447**
	15/16	**1 920.620**	**52.301**	**253.055**	**71.540**	**39.205**	**2 336.721**
	16/17	**1 920.677**	**46.200**	**227.181**	**76.200**	**57.585**	**2 327.843**
	17/18	**1 380.641**	**38.453**	**71.194**	**57.546**	**47.751**	**1 595.585**

Quantity of effluent received at the WWTWs (Ml/a):

The influent received at the Porterville-, Piketberg-, Eendekuil- and Velddrif WWTW is metered. The influent received at the Dwarskersbos WWTW is not metered and was therefore calculated as a percentage of the billed metered consumption data. The hydraulic and organic design capacities of the various WWTWs and the monthly flows and organic loads at the various plants, as well as the rainfall are included in Annexure A.

The table below gives an overview of the annual volume of effluent received at the various WWTWs.

Table C.1.4: Quantity of effluent received at the various WWTWs						
WWTWs	**% of Billed Metered Consumption**	**17/18**	**Record : Prior (Ml/a)**			
			16/17	**15/16**	**14/15**	**13/14**
Porterville	NA - Metered	212.643	250.359	230.070	258.434	270.415
Piketberg	NA - Metered	737.271	887.273	888.253	894.507	947.965
Velddrif	NA - Metered	279.270	287.420	277.040	214.727	216.150
Eendekuil	NA - Metered	2.437	3.405	5.244	*7.073*	*6.960*
Dwarskersbos	60%	*32.063*	*56.777*	*59.623*	*55.354*	*57.895*
Total		**1 263.684**	**1 485.234**	**1 460.230**	**1 430.095**	**1 499.385**

Note: *Estimated from billed metered data*

Quantity of treated effluent returned to the water resource system:

The quantity of effluent treated by industrial consumers on their own premises and re-used by them is not known at this stage. All effluent discharged into the Municipal sewer system is however treated at the existing WWTWs and the current effluent re-used practices are as follows:

Table C.1.5: Current effluent re-used practices at the various WWTWs	
WWTWs	**Current effluent re-used practices**
Porterville	On-site stream leading to farmer's irrigation dam
Piketberg	Irrigation of town sport fields: Cricket, Rugby and Soccer and golf course. Irrigation of school fields.
Velddrif	Irrigation of Rugby field, Golf course, Cricket field and Bowls field (Licence number: 12/9/11/L436/9 - section 5)
Eendekuil	Evaporate, but final effluent also run-off to farm dam for irrigation purposes
Dwarskersbos	Evaporate, but final effluent can also be pumped to farm for irrigation purposes

C.2. Water Services Delivery Profile

The National Norms and Standards for Domestic Water and Sanitation Services, as published in the Government Gazette No.41100 of 8 September 2017, makes provision for the following norms and standards for levels of water supply and sanitation services:

Table C.2.1: Norms and standards for levels of water supply services

Full level of service: People access and pay for more than 90 l/c/d at high pressure.	Interim **Full**	**Full provision**: People access a minimum of 50 l/c/d of SANS241 quality water on demand at the boundary of the yard, metered and tariffed.
Middle level of service: People access and pay for 51-90 l/c/d at medium pressure.	Interim **Upper**	**Upper provision**: People access a maximum of 90 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Intermediate**	Intermediate provision: People access more than 50 l/c/d but less than 90 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
Minimum level of service: People access 25-50 l/c/d at low to medium pressure, use of more than 25 l/c/d is paid for.	Interim **Basic Plus**	**Basic Plus provision**: People access more than 25 l/c/d but less than 50 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Basic**	**Basic provision**: People access a minimum of 25 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered and tariffed.
	Interim **Free Basic**	**Free basic provision**: People access a minimum of 25 l/c/d of SANS241 quality water from an improved source at the boundary of the yard, metered.
	Intermittent	**Intermittent provision**: People access a minimum of 1500 l/household/week of acceptable quality water on a weekly basis within 100m, which is metered.
Bulk service: Source of potable water to be provided to people, which is metered in all circumstances.		
No service / provision = backlog: People access water from insecure or unimproved sources, or sources that are too distant, too time consuming or are of poor quality.		

Interim provision: People access a minimum of 25 l/c/d of acceptable quality water within 24 hours of disruption, normal service to be restored within 7 days.

Proper disposal, clean platform, vector and rodent control,

Table C.2.2: Norms and standards for levels of sanitation services

Hygiene promotion; Prevention of pollution; Re-use / recycle; Operation and Maintenance; Metering and tariffing; Solid Waste Management; Asset Management		
Full level: Full concern for human health, environment and sustainability of interconnected systems.	**Full services**	**In-house facility**: Storm water, wastewater/excreta, greywater, solid waste are collected and managed to achieve maximum benefits from treatment and re-use of water and nutrients.
		In-house facility: Access to a pleasant, safe, reliable and properly maintained facility for 24 hours a day, with control of nutrients in human excreta, wastewater and greywater.
Basic level: Remove excreta from the environment through treatment, pathogen reduction, resource recovery and nutrient reuse.	**Free basic services**	**Toilet with functional hand washing facility in the yard**: Access to a pleasant, safe and reliable facility for 24 hours a day, including privacy, personal safety and shelter through a subsidy for free. Maintenance of the facility is for free and is the responsibility of services provider.
	Basic services	**Toilet with functional hand washing facility in the yard**. Access to a pleasant, safe and reliable facility for 24 hours a day, including privacy, personal safety and shelter through a capital subsidy. Maintenance of the facilities is not for free and is the responsibility of the household / owner.
Interim level: Blocking the spread of faecal-oral diseases through proper excreta containment at a fixed point.	**Excreta containment**	**Household, shared or communal toilets with functional hand washing facilities**: Access to safe, reliable and properly maintained toilet and hand washing facility, free of charge, within 200m of the dwelling, which at a minimum safely contains human excreta. Maintenance is the responsibility of the services provider. To be phased out by 2030.
No service / provision = backlog: People practice open defecation or access an unimproved sanitation facility, such as pit toilets and bucket toilets. To be completely eliminated by 2030.		

Emergency level: People access pleasant, safe, reliable and properly maintained improved toilets and hand washing facility on the premises in close proximity to the temporary dwelling within 24 hours and for duration of event.

C.2.1. User Connection Profile

The total number of user connections in each user sector, for the consumers provided with water services by Bergrivier Municipality, is as follows (June 2018):

Table C.2.1.1: User Connection Profile (Water Services)

WSDP Ref. #	Category of users	Water Services						
		Year 0 FY2017/18		Year - 1 FY2016/17		Year - 2 FY2015/16		New Connections Year 0 FY2017/18
		Nr	%	Nr	%	Nr	%	Nr
	RESIDENTIAL (DOMESTIC)							
3.3	Metered: Uncontrolled	8,501	95%	8,459	95%	8,346	95%	42
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0
	Unmetered (Flat rate)	0	0%	0	0%	0	0%	0
	Communal water supply	0	0%	80	1%	80	1%	-80
	Sub-Total: Residential	**8,501**	**95%**	**8,539**	**96%**	**8,426**	**96%**	**-38**
	EDUCATION							
3.3	Schools	20	0%	20	0%	20	0%	0
	Tertiary educaton facilities	0	0%	0	0%	0	0%	0
	Sub-Total: Education	**20**	**0%**	**20**	**0%**	**20**	**0%**	**0**
	HEALTH							
3.3	Clinics	10	0%	10	0%	10	0%	0
3.3	Hospitals	2	0%	2	0%	2	0%	0
3.3	Health Centres	0	0%	0	0%	0	0%	0
	Sub-Total: Health	**12**	**0%**	**12**	**0%**	**12**	**0%**	**0**
	INSTITUTIONAL							
	Public Institutions (Est)	62	1%	59	1%	54	1%	3
3.3	Magistrate Offices	3	0%	3	0%	3	0%	0
3.3	Police Stations	5	0%	5	0%	5	0%	0
3.3	Prisons	1	0%	1	0%	1	0%	0
	etc	0	0%	0	0%	0	0%	0
	Sub-Total: Institutional	**71**	**1%**	**68**	**1%**	**63**	**1%**	**3**
	INDUSTRIAL							
3.3	Dry industries	46	1%	46	1%	46	1%	0
3.3	Wet industries	9	0%	9	0%	9	0%	0
	Sub-Total: Industrial	**55**	**1%**	**55**	**1%**	**55**	**1%**	**0**
	COMMERCIAL							
3.3	Businesses	212	2%	207	2%	194	2%	5
3.3	Office Buildings (Incl. with Businesses)	0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**212**	**2%**	**207**	**2%**	**194**	**2%**	**5**
	MINING							
	Mining	0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**
	OTHER							
	Agriculture: raw water (Est)	7	0%	7	0%	7	0%	0
	Other (Est)	28	0%	26	0%	24	0%	2
	Sub-Total: Other	**35**	**0%**	**33**	**0%**	**31**	**0%**	**2**
	TOTAL	**8,906**	**100%**	**8,934**	**100%**	**8,801**	**100%**	**-28**

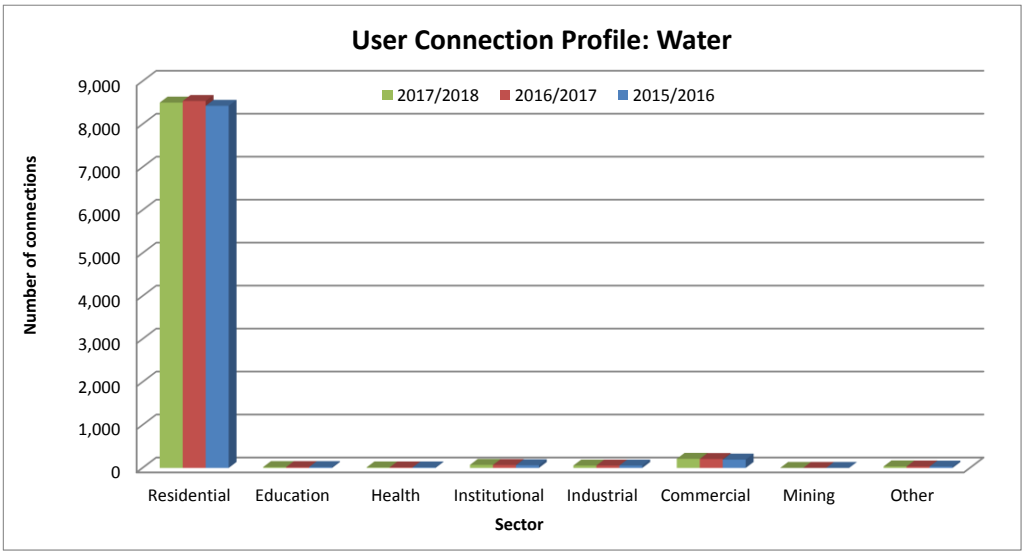


Figure C.2.1.1: User connection profile for water

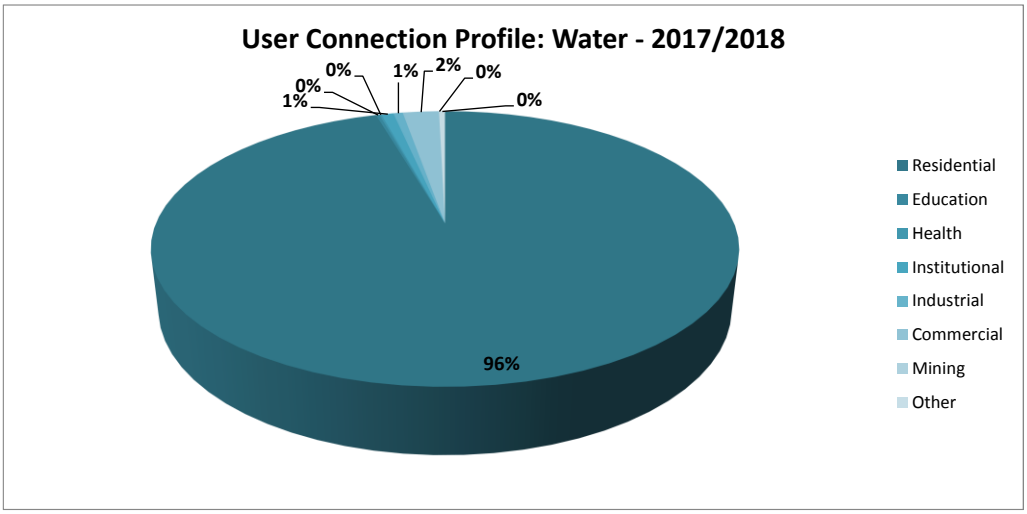


Figure C.2.1.2: User connection distribution for water – Year 2017/2018

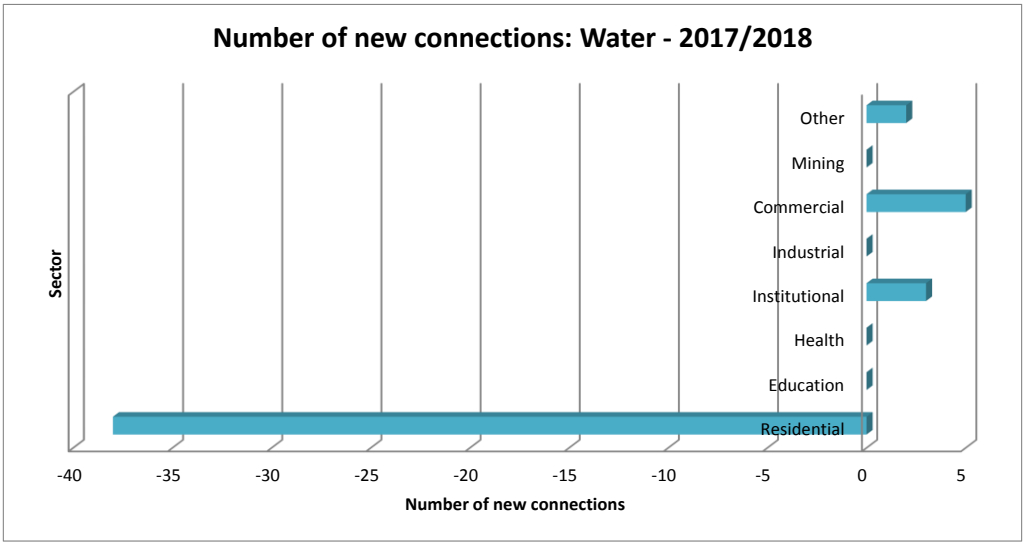


Figure C.2.1.3: Number of new water connections provided during 2017/2018

Table C.2.1.2: User Connection Profile (Wastewater Services)								
WSDP Ref. #	Category of users	Wastewater Services						
		Year 0 FY2017/18		Year - 1 FY2016/17		Year - 2 FY2015/16		New Connections Year 0 FY2017/18
		Nr	%	Nr	%	Nr	%	Nr
	RESIDENTIAL (DOMESTIC)							
3.3	Metered: Uncontrolled	8,501	95%	8,459	95%	8,346	95%	42
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0
	Unmetered (Flat rate)	0	0%	0	0%	0	0%	0
	Communal water supply	0	0%	80	1%	80	1%	-80
	Sub-Total: Residential	**8,501**	**95%**	**8,539**	**96%**	**8,426**	**96%**	**-38**
	EDUCATION							
3.3	Schools	20	0%	20	0%	20	0%	0
	Tertiary educaton facilities	0	0%	0	0%	0	0%	0
	Sub-Total: Education	**20**	**0%**	**20**	**0%**	**20**	**0%**	**0**
	HEALTH							
3.3	Clinics	10	0%	10	0%	10	0%	0
3.3	Hospitals	2	0%	2	0%	2	0%	0
3.3	Health Centres	0	0%	0	0%	0	0%	0
	Sub-Total: Health	**12**	**0%**	**12**	**0%**	**12**	**0%**	**0**
	INSTITUTIONAL							
	Public Institutions (Est)	62	1%	59	1%	54	1%	3
3.3	Magistrate Offices	3	0%	3	0%	3	0%	0
3.3	Police Stations	5	0%	5	0%	5	0%	0
3.3	Prisons	1	0%	1	0%	1	0%	0
	etc	0	0%	0	0%	0	0%	0
	Sub-Total: Institutional	**71**	**1%**	**68**	**1%**	**63**	**1%**	**3**
	INDUSTRIAL							
3.3	Dry industries	46	1%	46	1%	46	1%	0
3.3	Wet industries	9	0%	9	0%	9	0%	0
	Sub-Total: Industrial	**55**	**1%**	**55**	**1%**	**55**	**1%**	**0**
	COMMERCIAL							
3.3	Businesses	212	2%	207	2%	194	2%	5
3.3	Office Buildings (Incl. with Businesses)	0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**212**	**2%**	**207**	**2%**	**194**	**2%**	**5**
	MINING							
	Mining	0	0%	0	0%	0	0%	0
	Sub-Total: Commercial	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**
	OTHER							
	Agriculture: raw water (Est)	7	0%	7	0%	7	0%	0
	Other (Est)	28	0%	26	0%	24	0%	2
	Sub-Total: Other	**35**	**0%**	**33**	**0%**	**31**	**0%**	**2**
	TOTAL	**8,906**	**100%**	**8,934**	**100%**	**8,801**	**100%**	**-28**

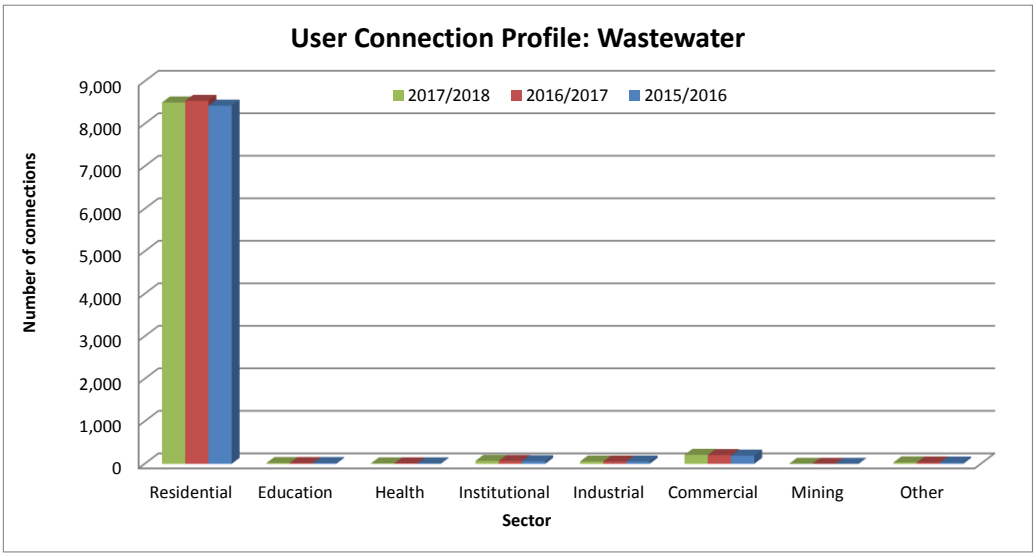


Figure C.2.1.4: User connection profile for wastewater

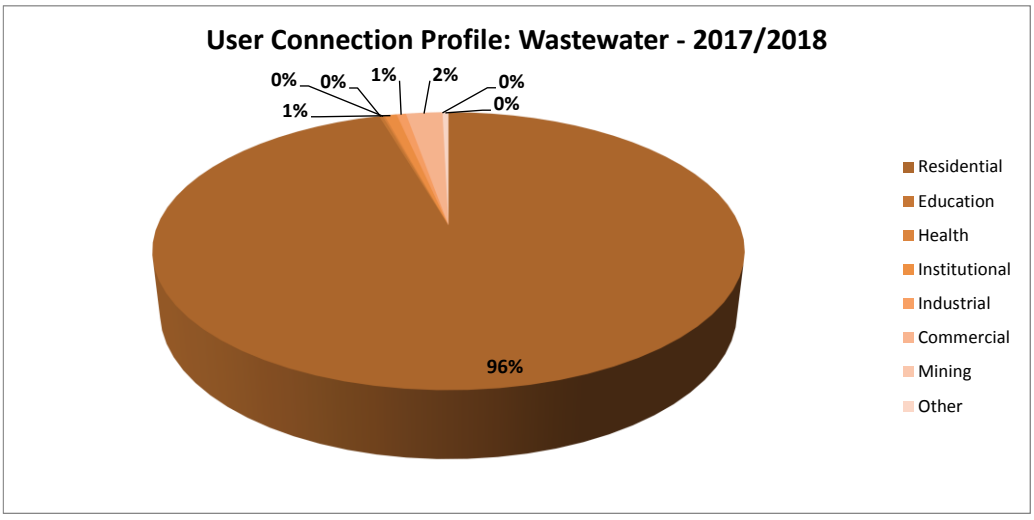


Figure C.2.1.5: User connection distribution for wastewater – Year 2017/2018

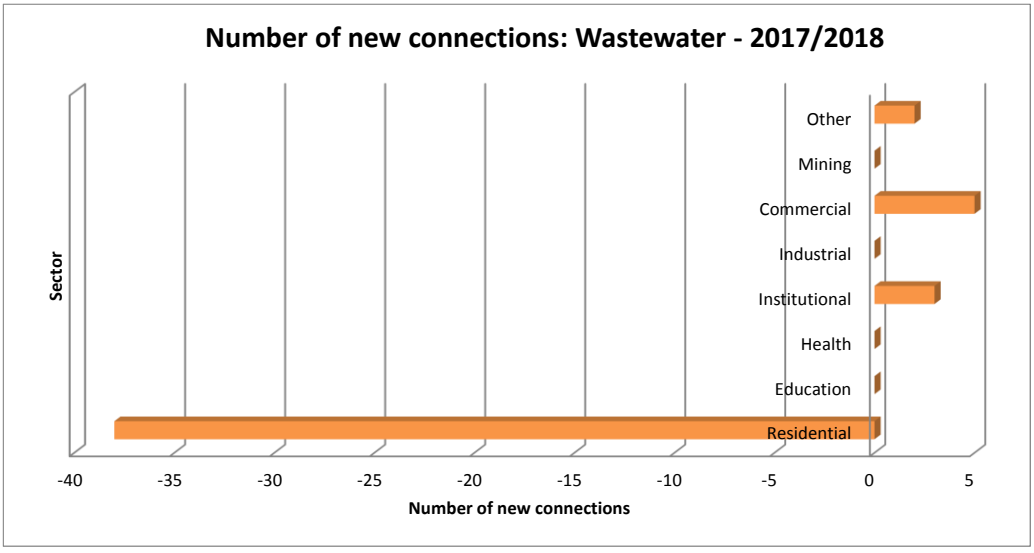


Figure C.2.1.6: Number of new wastewater connections provided during 2017/2018

The number of user connections in each user sector, for the various distribution systems in Bergrivier Municipality's Management Area, is as follows:

Table C.2.1.3: Number of user connections in each user sector per town				
Town	**Year**	**Residential and Commercial**	**Industrial**	**Total**
Porterville	13/14	1 589	-	**1 589**
	14/15	1 595	-	**1 595**
	15/16	1 588	-	**1 588**
	16/17	1 656	-	**1 656**
	17/18	1 657	-	**1 657**
Piketberg	13/14	2 441	50	**2 491**
	14/15	2 512	53	**2 565**
	15/16	2 500	54	**2 554**
	16/17	2 462	53	**2 515**
	17/18	2 424	49	**2 473**
Velddrif	13/14	3 228	-	**3 228**
	14/15	3 288	-	**3 288**
	15/16	3 373	-	**3 373**
	16/17	3 467	-	**3 467**
	17/18	3 552	-	**3 552**
Dwarskersbos	13/14	353	-	**353**
	14/15	373	-	**373**
	15/16	406	-	**406**
	16/17	423	-	**423**
	17/18	440	-	**440**
Aurora	13/14	250	-	**250**
	14/15	251	-	**251**
	15/16	252	-	**252**
	16/17	250	-	**250**
	17/18	245	-	**245**
Eendekuil	13/14	343	4	**347**
	14/15	349	4	**353**
	15/16	350	5	**355**
	16/17	345	5	**350**
	17/18	343	3	**346**
Redelinghuys	13/14	182	-	**182**
	14/15	187	-	**187**
	15/16	193	-	**193**
	16/17	193	-	**193**
	17/18	193	-	**193**
TOTAL	**13/14**	**8 386**	**54**	**8 440**
	14/15	**8 555**	**57**	**8 612**
	15/16	**8 662**	**59**	**8 721**
	16/17	**8 796**	**58**	**8 854**
	17/18	**8 854**	**52**	**8 906**

Table C.2.1.4: Total number of consumer units per town and percentage annual growth from 2013/2014 to 2017/2018						
Distribution System	**Annual Growth % (13/14 – 17/18)**	**17/18**	**16/17**	**15/16**	**14/15**	**13/14**
Porterville	1.05%	1 657	1 656	1 588	1 595	1 589
Piketberg	-0.18%	2 473	2 515	2 554	2 565	2 491
Velddrif	2.42%	3 552	3 467	3 373	3 288	3 228
Dwarskersbos	5.66%	440	423	406	373	353
Aurora	-0.50%	245	250	252	251	250
Eendekuil	-0.07%	346	350	355	353	347
Redelinghuys	1.48%	193	193	193	187	182
TOTALS	**1.35%**	**8 906**	**8 854**	8 721	**8 612**	**8 440**

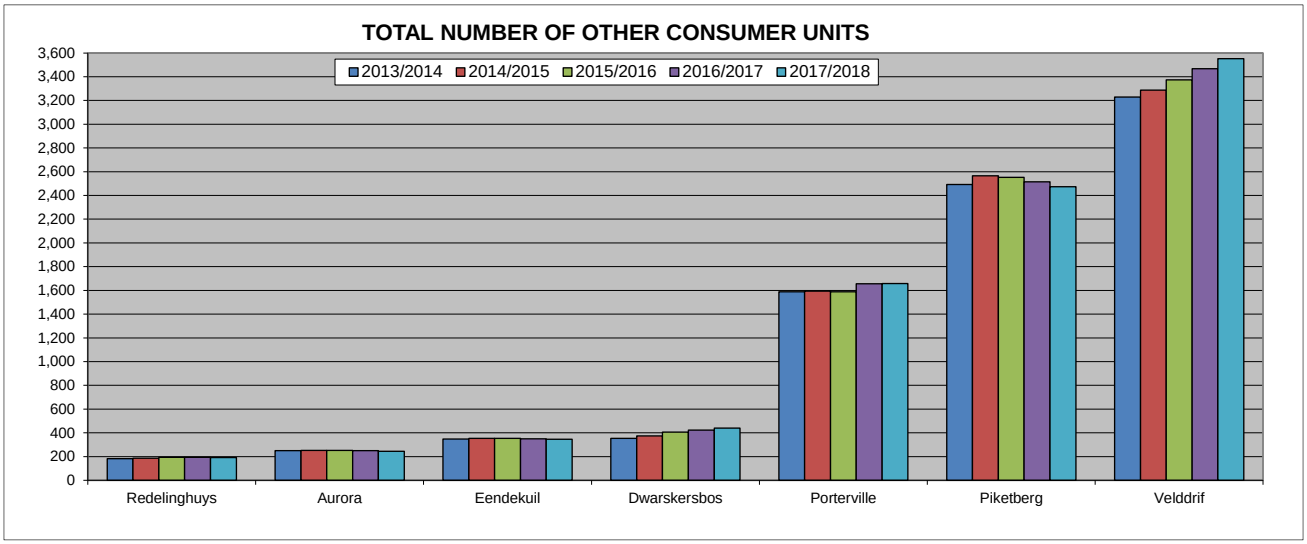


Figure C.2.1.7: Number of consumer units per town for the last five financial years.

The number of new water and sanitation connection made:

105 New water connections and 35 new sewer connections were provided during the 2017/2018 financial year, according to the Civil Services Department. These numbers are different from the number of new connections included in the previous tables and figures, because the information previously presented was taken from the Financial System. The actual number of new water and sewer connections provided will not always correspond 100% with the financial information, because some erven can already have a connection and then the consumer only apply at a later stage to be connected to the system.

Table C.2.1.5: Total number of new water and sanitation connections for 2014/2015 – 2017/2018																
Distribution System	**New Water Connections**				**Water Meters Replaced**				**Water Meters Tested**				**New Sewer Connections**			
	17/18	**16/17**	**15/16**	**14/15**	**17/18**	**16/17**	**15/16**	**14/15**	**17/18**	**16/17**	**15/16**	**14/15**	**17/18**	**16/17**	**15/16**	**14/15**
Porterville	6	7	7	21	417	49	85	21	0	2	5	3	1	4	4	4
Piketberg	10	13	4	7	45	0	10	9	0	0	0	2	8	8	7	2
Velddrif and Dwarskersbos	83	100	46	54	137	194	24	152	0	15	15	0	25	Unk	Unk	54
Aurora	0	5	2	3	14	12	13	30	0	0	0	0	0	0	0	0
Eendekuil	2	8	1	1	3	2	3	2	0	2	4	1	1	2	1	0
Redelinghuys	4	2	5	5	0	0	2	1	0	0	0	0	0	0	0	0
TOTALS	**105**	**135**	**65**	**91**	**616**	**257**	**137**	**215**	**0**	**19**	**24**	**6**	**35**	**14**	**12**	**60**

The Municipality has a water meter replacement programme in place where old / dysfunctional water meters are replaced. In both Piketberg and Velddrif approximately 1 000 meters per town has to be replaced and approximately 150 meters in Redelinghuys.

C.2.2. Residential Water Services Delivery Access Profile

The residential water services delivery access profile is presented below and is aligned with the format proposed for the Municipal Annual Report as contemplated in the MFMA. It is emphasized that this access profile does not consider quality or adequacy of services as presented in the next section.

All the formal households in the urban areas of Bergrivier Municipality's Management Area are provided with water connections inside the erven. Informal areas are supplied with shared services as an intermediary measure. Bergrivier Municipality is committed to work with the private landowners to ensure that at least basic water and sanitation services are provided to those households in the rural areas with existing services still below RDP standard.

The table below gives an overview of the residential water services delivery access profile of Bergrivier Municipality.

Table C.2.2.1: Residential Water Services Delivery Access Profile: Water

Census Category	Description	Year 0 FY2017/18		Year - 1 FY2016/17		Year - 2 FY2015/16	
		Nr	%	Nr	%	Nr	%
	WATER (ABOVE MIN LEVEL)						
Piped (tap) water inside dwelling/institution	House connections	14,781	77%	14,599	78%	14,474	80%
Piped (tap) water inside yard	Yard connections	4,083	21%	3,735	20%	3,397	19%
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	Standpipe connection < 200 m	128	1%	208	1%	208	1%
	Sub-Total: Minimum Serivce Level and Above	**18,992**	**99%**	**18,542**	**99%**	**18,079**	**99%**
	WATER (BELOW MIN LEVEL)						
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	Standpipe connection: > 200 m < 500 m	12	0%	12	0%	12	0%
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	Standpipe connection: > 500 m < 1 000 m	5	0%	5	0%	5	0%
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	Standpipe connection: > 1 000 m	6	0%	6	0%	6	0%
No access to piped (tap) water	No services	76	0%	76	0%	76	0%
	Sub-Total: Below Minimum Service Level	**99**	**1%**	**99**	**1%**	**99**	**1%**
	Total number of households	**19,091**	**100%**	**18,641**	**100%**	**18,178**	**100%**

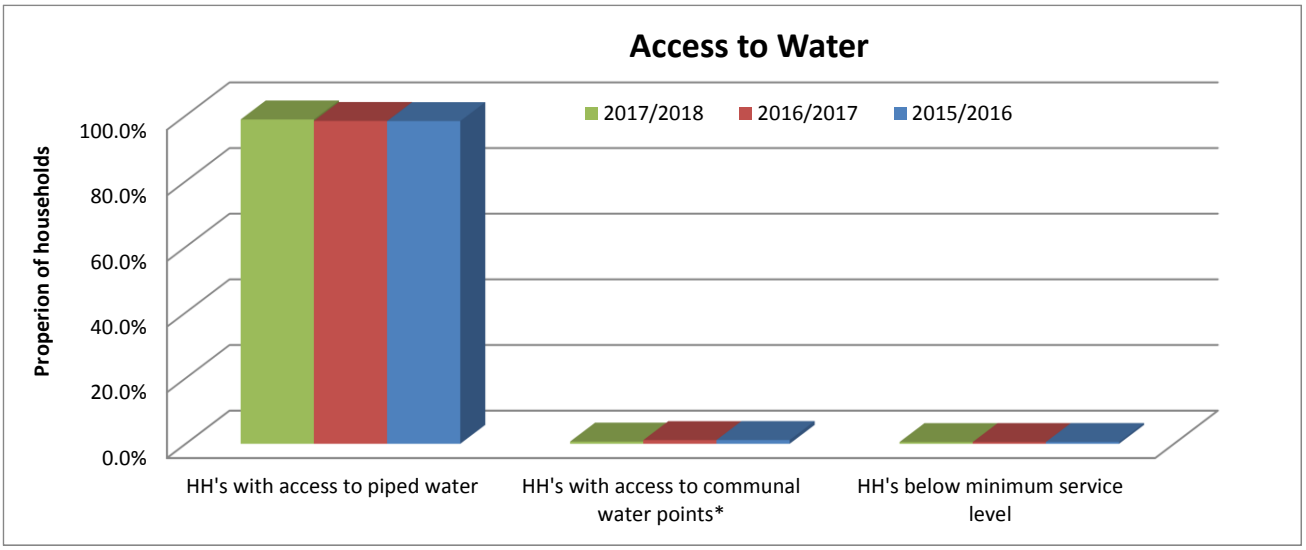


Figure C.2.2.1: Household water access profile

Number of households provided with water through communal water services:

The National Norms and Standards for Domestic Water and Sanitation Services, as published in the Government Gazette No.41100 of 8 September 2017, include the following interim water and sanitation services:

Table C.2.2.2: Interim water and sanitation services (National Norms and Standards for Domestic Water and Sanitation Services)
Intermittent provision of water at a minimum level of water supply services
• A minimum volume of 1 500 litres of potable water shall be made available to a household per week. • The water provided shall comply with the SANS241 quality standards. • The access/delivery point shall be at a minimum a communal standpipe, or a storage facility in the yard (water container, yard tank, roof tank) of at least a volume of 1 500 litres. • In the case of a communal standpipe, it shall be within a reasonable walking distance of no more than 100m from the farthest household. • In the case of a storage facility in the yard (water container, yard tank, roof tank), it shall be refilled by a water tanker with potable water at least once a week. • The water shall be made available for 52 weeks per year. • All water use and/or supply shall be metered, but not tariffed. • Maintenance of the infrastructure for this level of service is the responsibility of the WSA. • Point-of-use water treatment systems and methods shall be advocated. • Efforts shall be made to ensure user acceptance and understanding for this level of service. • Users shall be educated in effective water use and hygiene. • This level of service shall be phased out by 2030 to comply with the National Development Plan's requirement of providing a basic service of at least a yard connection for water.
Interim sanitation services (Communal and shared facilities)
• Users shall be consulted on the siting and design, and the responsible cleaning and maintenance of shared toilets. Clean toilets are more likely to be frequently used. • Plumbing in and for communal and shared facilities needs to be more robust than that installed on private premises, and shall comply with the general principles of the National Building Regulations. Precautions need to be taken in the design against vandalism, theft and misuse. • Efforts shall be made to provide people living with chronic illnesses, such as HIV and AIDS, with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility. • Where possible, communal and shared toilets must be provided with lighting, or users provided with torches. The input of the users must be sought with regard to ways of enhancing the safety of users. • Efforts to build a sense of communal ownership and pride of possession shall be made so that cooperation is voluntarily given or assured by peer pressure. • Sufficient sanitation facilities shall be provided for the number of users

Table C.2.2.2: Interim water and sanitation services (National Norms and Standards for Domestic Water and Sanitation Services)
Intermittent provision of water at a minimum level of water supply services
➢ Communal toilet: Toilet seats – 1 seat per 50 users; Urinal units – 1 unit per 100 users; Hand washing – 1 basin per 10 toilet seats. ➢ Shared toilet mostly used all the time: Toilet seats – 1 seat per 20 users; Urinal units – 1 unit per 50 users; Hand washing – 1 basin per 4 toilet seats. • Shared and communal facilities shall have separate toilet blocks for men and women with separate entries; waste bins with lids in toilet block for women – emptied once a week and disposed of appropriately; urinal facilities for men; seats for children in the section for women; waiting / circulating area; separate washing cubicles for men and women; facility to store large volumes of water (water-borne sanitation); appropriate wastewater disposal system; and store room for keeping the cleaning material / equipment.

There are no informal areas in the urban areas of Bergrivier Municipality's Management Area and the only areas where communal water services are currently still in use is on some of the farms in the rural areas.

The existing residential water service levels in Bergrivier Municipality's Management Area are estimated as follows:

Table C.2.2.3: Residential water service levels (Residential Consumer Units)											
Service Level	**Piketberg**	**Porterville**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Wittewater**	**Redelinghuys**	**Eendekuil**	**Goedverwacht**	**Farms**	**Total**
No Water Services	0	0	0	0	0	2 [2)]	0	0	0	74 [2)]	76
Below RDP: Infrastructure Upgrade	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure Extension	0	0	0	0	0	0	0	0	0	23 [3)]	23
Below RDP: Infrastructure Refurbishment	0	0	0	0	0	0	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0	0	0	0	0	0	0
Total Basic Need (RDP)	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**97**	**99**
Below Housing Interim [4)]	0	0	0	0	0	0	0	0	0	0	0
Adequate Housing Permanent [5)]	0	0	0	0	0	0	0	0	0	0	0
Total Housing Need	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Standpipes	0	0	0	0	0	2	0	0	2	124	128
Yard Connections [6)]	923	548	1 457	0	0	0	0	95	0	1 060	4 083
House Connections [1)]	2 365	1 583	3 397	421	245	192	184	332	605	5 457	14 781
Total Adequate	**3 288**	**2 131**	**4 854**	**421**	**245**	**194**	**184**	**427**	**607**	**6 641**	**18 992**
Total per Area	**3 288**	**2 131**	**4 854**	**421**	**245**	**196**	**184**	**427**	**607**	**6 738**	**19 091**

Notes:
1) Number of residential consumer units for the various towns for 2017/2018, as calculated from the financial data. The estimated number of commercial units was subtracted from the total number of consumer units, in order to calculate the residential consumer units per town.
2) Census 2011: Number of households with no access to piped (tap) water 74 and 2
3) Census 2011: Number of households with communal services (200m – 500m) 12, (500m – 1000m) 5 and (>1000m) 6.
4) Below Housing Interim in the above table is the number of shacks in informal areas without basic water services.
5) Adequate Housing Permanent in the above table is the number of shacks in informal areas with communal water services, as confirmed by the Municipality.
6) Projected number of residential households (2017/2018) – Number of residential consumers units (2017/2018) = Estimated number of backyard dwellers

The Municipality provides sanitation services to all towns in its area of jurisdiction with the exception of Goedverwacht, Wittewater and De Hoek, which are private towns. All the urban households within the Municipality's area of jurisdiction have access to minimum sanitation service levels. The table below gives an overview of the residential sanitation services delivery access profile of Bergrivier Municipality.

Table C.2.2.3: Residential Water Services Delivery Access Profile: Sanitation

Census Category	Description	Year 0 FY2017/18		Year - 1 FY2016/17		Year - 2 FY2015/16	
		Nr	%	Nr	%	Nr	%
	SANITATION (ABOVE MIN LEVEL)						
Flush toilet (connected to sewerage system)	Waterborne	9,720	51%	9,288	50%	8,953	49%
	Waterborne: Low Flush	0	0%	0	0%	0	0%
Flush toilet (with septic tank)	Septic tanks / Conservancy	8,160	43%	8,062	44%	7,934	44%
Chemical toilet	Non-waterborne (above min. service level)	35	0%	35	0%	35	0%
Pit toilet with ventilation (VIP)		83	0%	83	0%	83	0%
Other / Communal Services		0	0%	80	0%	80	0%
	Sub-Total: Minimum Serivce Level and Above	**17,998**	**94%**	**17,548**	**94%**	**17,085**	**94%**
	SANITATION (BELOW MIN LEVEL)						
Pit toilet without ventilation	Pit toilet	36	0%	36	0%	36	0%
Bucket toilet	Bucket toilet	177	1%	177	1%	177	1%
Other toilet provision (below min. service level	Other	364	2%	364	2%	364	2%
No toilet provisions	No services	516	3%	516	3%	516	3%
	Sub-Total: Below Minimum Service Level	**1,093**	**6%**	**1,093**	**6%**	**1,093**	**6%**
	Total number of households	**19,091**	**100%**	**18,641**	**100%**	**18,178**	**100%**

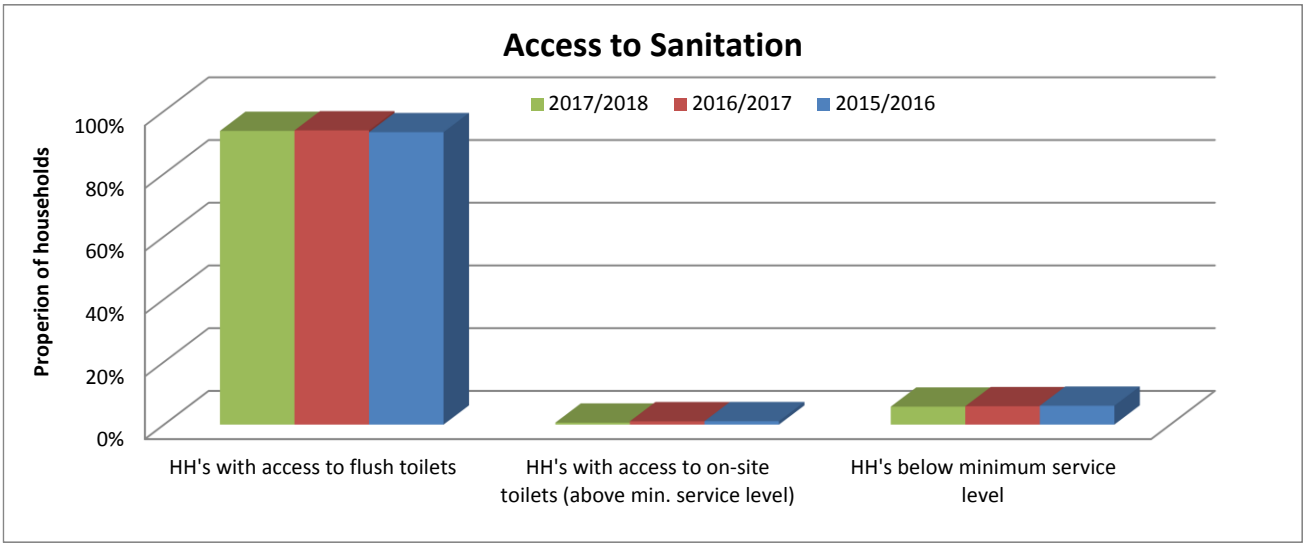


Figure C.2.2.2: Household sanitation access profile

The Municipality upgraded their WWTWs and sewer networks in order to provide a better quality of effluent and to increase the capacity of the WWTWs to accommodate the future developments, subject to available funding. One of the most recent projects is the upgrading of the Porterville WWTW. The sanitation service levels within the various towns can be described as follows:

- Aurora and Redelinghuys: The entire towns of Aurora and Redelinghuys are serviced by septic tank systems. The goal of the Municipality is to upgrade the towns to a waterborne sewer system, which include new WWTWs to treat the generated sewage.

- Dwarskersbos: Approximately 45% - 55% of the households in Dwarskersbos are serviced through septic tanks. The upgrading of the septic tank systems to a waterborne sewer system including incorporation into the existing waterborne network is ongoing.

- Eendekuil: Approximately 25% - 35% of the households in Eendekuil are serviced through septic tanks. The upgrading of the septic tank systems to a waterborne sewer system including incorporation into the existing waterborne network is ongoing.

- Piketberg and Porterville: All households in these two towns are connected to the waterborne sewer system. The Municipality is currently busy with the upgrading of the Porterville WWTW, due to various developments over the last number of years.

- Velddrif: Approximately 20% - 25% of the households in Velddrif are serviced through septic tanks. The upgrading of the septic tank systems to a waterborne sewer system including incorporation into the existing waterborne network is ongoing.

The existing residential sanitation service levels in Bergrivier Municipality's Management Area are estimated as follows:

Table C2.2.4: Residential sanitation service levels (Residential Consumer Units)											
Service Levels	**Piketberg**	**Porterville**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Wittewater**	**Redelinghuys**	**Eendekuil**	**Goedverwacht**	**Farms**	**Total**
No Sanitation Services [3]	0	0	0	0	0	0	0	0	10	506	516
Below RDP: Infrastructure Upgrade [4]	0	0	0	0	0	24	0	0	70	518	612
Below RDP: Infrastructure Extension	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure Refurbishment	0	0	0	0	0	0	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0	0	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0	0	0	0	0	0	0
Total Basic Need (RDP)	**0**	**0**	**0**	**0**	**0**	**24**	**0**	**0**	**80**	**1 024**	**1 128**
Below Housing Interim [5]	0	0	0	0	0	0	0	0	0	0	0
Adequate Housing Permanent [6]	0	0	0	0	0	0	0	0	0	0	0
Total Housing Need	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
None Waterborne	0	0	0	0	0	30	0	0	9	44	83
Waterborne Low Flush	0	0	0	0	0	0	0	0	0	0	0
Septic Tanks / Conservancy [1]	0	0	1 050	217	245	142	184	134	518	5 670	8 160
Waterborne WWTW	3 288	2 131	3 804	204	0	0	0	293	0	0	9 720
Total Adequate [2]	**3 288**	**2 131**	**4 854**	**421**	**245**	**172**	**184**	**427**	**527**	**5 714**	**17 963**
Total per Area	**3 288**	**2 131**	**4 854**	**421**	**245**	**196**	**184**	**427**	**607**	**6 738**	**19 091**

1) Waterborne Low Flush, Septic Tanks and Conservancy tanks as agreed with the Municipality during January 2014, as part of DWS's Backlog Eradication Strategy process.

2) House Connections for 2017/2018 were projected from the 2011 Census data, except for Dwarskersbos, Aurora and Redelinghuys where the number of consumer units as calculated from the financial system were used. The Backyard dwellers are included in these figures.

3) Census 2011: Number of households with no toilet facility 506 + 10.

4) Census 2011: Number of households with existing buckets 131 + 39 +7, chemical toilets 23 + 12, pit toilets without ventilation 30 +2 + 4 and "other" 334 + 29 +1.

5) Below Housing Interim in the above table is the number of shacks in informal areas without basic sanitation services.

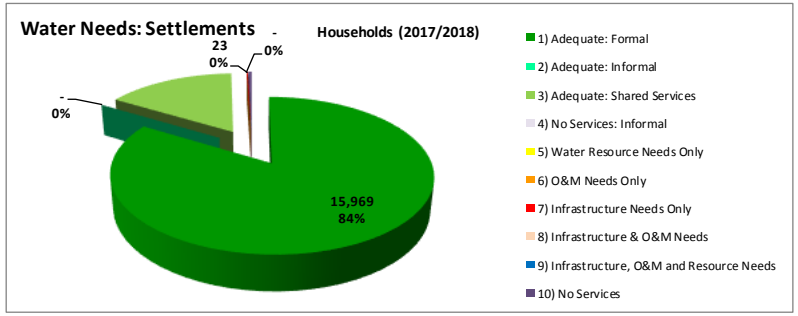
6) Adequate Housing Permanent in the above table is the number of shacks in informal areas with communal ablution facilities, as confirmed by the Municipality.

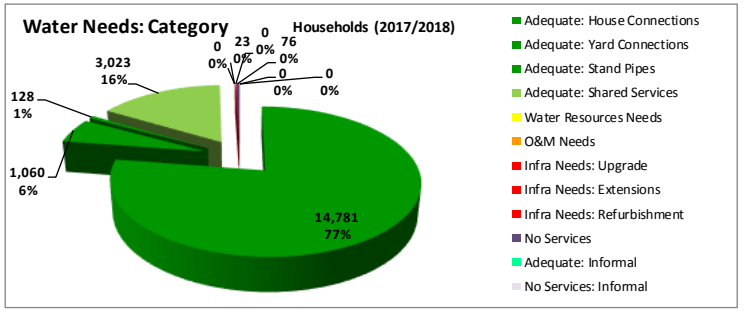
C.2.3. Residential Water Services Delivery Adequacy Profile

The existing residential water service levels in Bergrivier Municipality's Management Area are estimated as follows:

Table C.2.3.1: Residential Water Services Ddelivery Adequacy Profile (Water)

Water Categorisation	Number of settlements	FORMAL																		INFORMAL			
		Adequate								Water Resource needs		O & M Needs		Infrastructure Needs						No services		Adequate		No services	
		House Connections		Yard Connections		Stand Pipes		Shared Services						Upgrades		Extensions		Refurbishment							
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	37	14,781	100%	1,060	100%	128	100%																		
2	0																								
3	10							3,023	100%																
4	0																								
5	0																								
6	0																								
7	3															23	100%								
8	0																								
9	0																								
10	3																			76	100%				
Total Household Interventions required		14,781		1,060		128		3,023		0		0		0		23		0		76		0		0	



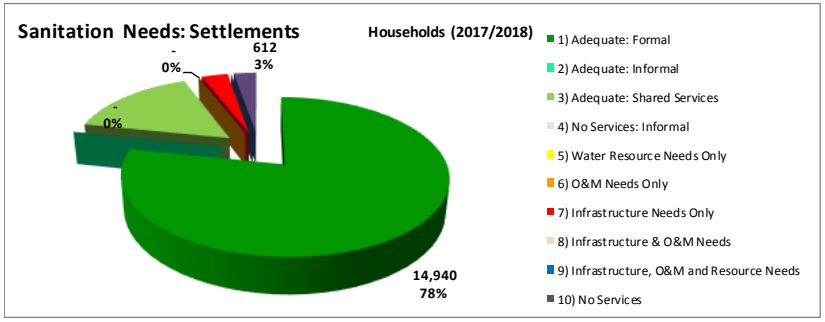


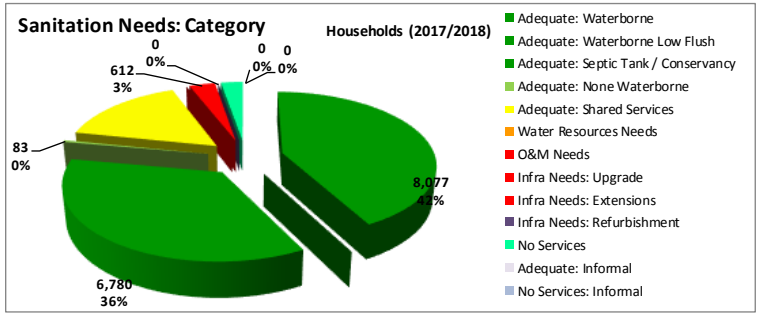
1	Adequate	3	Adequate: Shared services	5	Water Resources Needs **Only**	7	Infrastructure Needs **Only**	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs **Only**	8	Infrastructure& O&M needs	10	No Services

The existing residential sanitation service levels in Bergrivier Municipality's Management Area are estimated as follows:

Table C.2.3.2: Residential Water Services Delivery Adequacy Profile (Sanitation)

Water Categorisation	Number of settlements	FORMAL																				INFORMAL			
		Adequate										Water Resource needs		O & M Needs		Infrastructure Needs						Adequate		No services	
		Waterborne		Waterborne Low flush		Septic Tank/ Conservancy		None Waterborne		Shared Services						Upgrades		Extensions		Refurbishment		No services			
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	37	8,077	100%			6,780	100%	83	1																		
2	0																										
3	10									3,023	100%																
4	0																										
5	0																										
6	0																										
7	3															612	100%										
8	0																										
9	0																										
10	3																					516	100%				
Total Household Interventions required		8,077		0		6,780		83		3,023		0		0		612		0		0		516		0		0	





1	Adequate	3	Adequate: Shared services	5	Water Resources Needs **Only**	7	Infrastructure Needs **Only**	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs **Only**	8	Infrastructure & O&M needs	10	No Services

C.3. Cost Recovery and Free Basic Services

C.3.1. Tariffs

The water tariff structures for Bergrivier Municipality for the 2017/2018 financial year and the previous four financial years are summarised in the table below (Include VAT).

Table C.3.1: Water tariffs for 2017/2018 and the previous four financial years

Consumer/Description	Category	17/18	16/17	15/16	14/15	13/14
Availability Fee (Water per erven per year)		R783-00	R726-00	R685-00	R644-00	R596-00
Test of Meters		R289-00	R268-00	R253-00	R239-00	R221-00
Basic Monthly Charge		R53-64	R47-00	R44-00	R41-00	R38-00
Residential	0 – 6 kl	R7-58	-	-	-	-
	7 – 13 kl	R16-04	-	-	-	-
	14 – 20 kl	R19-03	-	-	-	-
	21 – 35 kl	R23-75	-	-	-	-
	36 – 50 kl	R28-78	-	-	-	-
	51 kl +	R38-36	-	-	-	-
Commercial (Included residential consumers up to 2016/2017)	0 – 6 kl	R7-58	R6-57	R6-20	R5-82	R5-39
	7 – 20 kl	R15-28	R13-25	R12-50	R11-73	R10-86
	21 – 50 kl	R15-28	R13-25	R12-50	R11-74	R10-87
	51 – 100 kl	R17-60	R15-25	R14-39	R13-51	R12-51
	101 – 200 kl	R18-50	R16-03	R15-12	R14-20	R13-15
	201 – 1 000 kl	R19-46	R16-86	R15-91	R14-95	R13-84
	1 000 – 1 500 kl	R16-53	R14-33	R13-52	R12-68	R11-74
	1 501 – 2 000 kl	R14-03	R12-17	R11-48	R10-79	R9-99
	> 2 000 kl	R11-89	R10-30	R9-72	R9-14	R8-46
Sport Clubs / Schools / Welfare Organisations	0 – 500 kl	R8-50	R6-00	R6-00	R5-82	R5-39
	501 kl +	R12-50				
Municipal Usage	0 – 500 kl	R8-50	R6-00	R6-00	R5-82	R5-39
	501 kl +	R12-50				
Consumers outside previous municipal area	0 – 500 kl	R8-50	R6-00	R6-00	R11-73	R10-86
	501 kl +	R12-50				
New connection		R2 885-00	R2 674-00	R2 523-00	R2 380-05	R2 203-75
Changing from 15mm to 20mm		R1 464-00	R1 357-00	R1 280-00	R1 207-44	R1 118-00

The above rates are based on saving measures of 20%. If these measures increase further, the above-mentioned tariffs will increase by 2.5% for every 5% that increases the savings measures.

The sewerage tariff structures for Bergrivier Municipality for the 2017/2018 financial year and the previous four financial years are summarised in the table below (Include VAT).

Table C.3.2: Sewerage tariffs for 2017/2018 and the previous four financial years

Consumer/Description	Category	17/18	16/17	15/16	14/15	13/14
Fixed monthly standard charge per connection / resident unit.		R153-00	R142-00	R134-00	R125-40	R116-11
Septic Tanks: Velddrif	During office hours	R352-00	R326-00	R308-00	R290-25	R268-75
	After office hours	R577-00	R535-00	R505-00	R476-01	R440-75
	Sundays / Public Holidays	R1 013-00	R939-00	R886-00	R835-92	R774-00
Septic Tanks: Eendekuil	During office hours	R148-00	R137-00	R129-00	R121-91	R112-88
Septic Tanks: Aurora	During office hours	R148-00	R137-00	R129-00	R121-91	R112-88

Table C.3.2: Sewerage tariffs for 2017/2018 and the previous four financial years						
Consumer/Description	**Category**	**17/18**	**16/17**	**15/16**	**14/15**	**13/14**
Septic Tanks: Outside previous municipal area	During office hours	R577-00	R535-00	R505-00	R476-01	R440-75
	After office hours	R1 310-00	R1 214-00	R1 145-00	R1 079-73	R999-75
	Sundays / Public Holidays	R2 026-00	R1 878-00	R1 772-00	R1 671-84	R1 548-00
	Outside town boundaries per km from WWTW	R8-00	R7-00	R7-00	R6-97	R6-45
New connection same side of road		R873-00	R809-00	R763-00	R720-00	R667-00
New connection on other side of road		R1 746-00	R1 618-00	R1 526-00	R1 440-00	R1 333-00

C.3.2. Metering, Billing and Free Basic Services

Service charges relating to water are based on consumption and a basic charge as per Council resolution. Meters are read on a monthly basis and are recognised as revenue when invoiced. Provisional estimates of consumption are made monthly when meter readings have not been performed. The provisional estimates of consumption are recognised as revenue when invoiced. Adjustments to provisional estimates of consumption are made in the invoicing period in which meters have been read. These adjustments are recognised as revenue in the invoicing period. Services relating to sanitation (sewerage) are recognised on a monthly basis in arrears by applying the approved tariff to each property. Tariffs are determined per category of property usage. In the case of residential property, a fixed monthly tariff is levied and in the case of commercial property, a tariff is levied based on the number of sewerage connections on the property. Service charges are based on a basic charge as per Council resolution.

The table below gives an overview of the metering, billing and free basic services of Bergrivier Municipality.

Table C.3.2.1: Overview of Metering, Billing and Free Basic Services

Regulations Ref. #	Description	Unit	Year 0	Year - 1	Year - 2
			FY2017/18	FY2016/17	FY2015/16
	UNITS SUPPLIED (as per water services access profile)				
10.2 (b) (i)	Household water connections (house and yard connections)	Nr	**18,864**	**18,334**	**17,871**
10.2 (b) (iv)	Household sewerage connections	Nr	**17,880**	**17,350**	**16,887**
	METERING				
	Metered Water Connections (aligned with Table C2.1)				
	Residential	Nr	8,501	8,459	8,346
	Commercial / Business	Nr	212	207	194
	Industrial	Nr	55	55	55
	Government / Institutional	Nr	103	100	95
	etc.	Nr	35	33	31
	Sub-Total: Metered Water Connections	**Nr**	**8,906**	**8,854**	**8,721**
	Proportion of metered connections (residential)*	%	45%	46%	47%
	Total number of meters	Nr	**8,906**	**8,854**	**8,721**
10.2 (b) (vi)	Total number of new connections (aligned with Table C.2.1)	Nr	52	133	109
10.2 (e) (i)	Total number of new meters installed	Nr	52	133	109
	Proportion of new connections, metered	%	100.0%	100.0%	100.0%
	Number of meters tested	Nr	0	19	24
10.2 (e) (ii)	Proportion of meters tested to total number of meters	%	0.0%	0.2%	0.3%
	Number of meters replaced	Nr	616	257	137
10.2 (e) (ii)	Proportion of meters replaced to total number of meters	%	6.9%	2.9%	1.6%
	BILLING				
	Customer billing (water and sewerage)		**Nr**	**Nr**	**Nr**
	Residential	Nr	8,501	8,459	8,346
	Commercial / Business	Nr	212	207	194
	Industrial	Nr	55	55	55
	Government / Institutional	Nr	103	100	95
	etc.	Nr	35	33	31
	Sub-Total: Customers billed	Nr	**8,906**	**8,854**	**8,721**
	Proportion of bills to metered connections	%	**100%**	**100%**	**100%**
	Residential	%	100%	100%	100%
	Commercial / Business	%	100%	100%	100%
	Industrial	%	100%	100%	100%
	Government / Institutional	%	100%	100%	100%
	etc.	%	100%	100%	100%
	FREE BASIC SERVICES				
	Nr customers receiving:				
	Free Basic Water	Nr	1,746	1,890	1,687
10.2 (b) (v)	Free Basic Sanitation	Nr	1,534	1,693	1,516
	Proportion of Free Basic Services				
	Water	%	21%	22%	20%
	Sewerage	%	9%	10%	9%

Note: * All residential consumers in the urban areas of Bergrivier Municipality's Management Area are metered. The "Water Services Access Profile" however includes the consumers on the farms and the backyard dwellers on formal erven in the urban areas. Backyard dwellers use the service of the main house, which is metered. Consumers on the farms utilise their own water sources, which is not metered by the Municipality, therfore the 40% - 50% compliance in the above table.

C.3.3. Revenue Collection and Cost Recovery

The table and figures below gives an overview of Bergrivier Municipality's water services revenue collection and cost recovery.

Table C.3.3.1: Overview of Water Services Revenue Collection and Cost Recovery				
Regulations Ref. #	Description	Year 0	Year - 1	Year - 2
		FY2017/18	FY2016/17	FY2015/16
	INCOME	**R'000**	**R'000**	**R'000**
	Billed			
	Water reticulation / provision	R 18,394	R 33,382	R 39,125
	Sewerage / wastewater	R 24,148	R 13,595	R 15,314
	Sub-Total: Billed	**R 42,543**	**R 46,977**	**R 54,439**
	Collections			
	Water reticulation / provision	R 20,453	R 33,936	R 41,381
	Sewerage / wastewater	R 24,522	R 14,696	R 18,734
	Sub-Total: Collections	**R 44,975**	**R 48,633**	**R 60,115**
	Equitable share income			
	Water reticulation / provision	R 1,947	R 1,723	R 2,178
	Sewerage / wastewater	R 2,870	R 2,983	R 2,952
	Sub-Total: Equitable share income	**R 4,817**	**R 4,706**	**R 5,130**
	EXPENDITURE (O&M)	**R'000**	**R'000**	**R'000**
	Water services	R 20,479	R 20,772	R 19,440
	Sewerage / wastewater services	R 9,987	R 11,739	R 9,729
	Total: Water Services O&M	**R 30,466**	**R 32,512**	**R 29,168**
	COST RECOVERY ANALYSIS / RATIO'S	**%**	**%**	**%**
10.2 (d) (ii)	**Billed as % of Cost**			
	Water	99%	169%	212%
	Sewerage	271%	141%	188%
	Total	**140%**	**144%**	**187%**
10.2 (d) (iii)	**Unrecovered as % of Cost**			
	Water services	-1%	6%	0%
	Sewerage / wastewater services	25%	16%	-5%
	Total	**8%**	**9%**	**-2%**

The figure below gives an overview of the revenue collection and cost recovery profile for water services for Bergrivier Municipality.

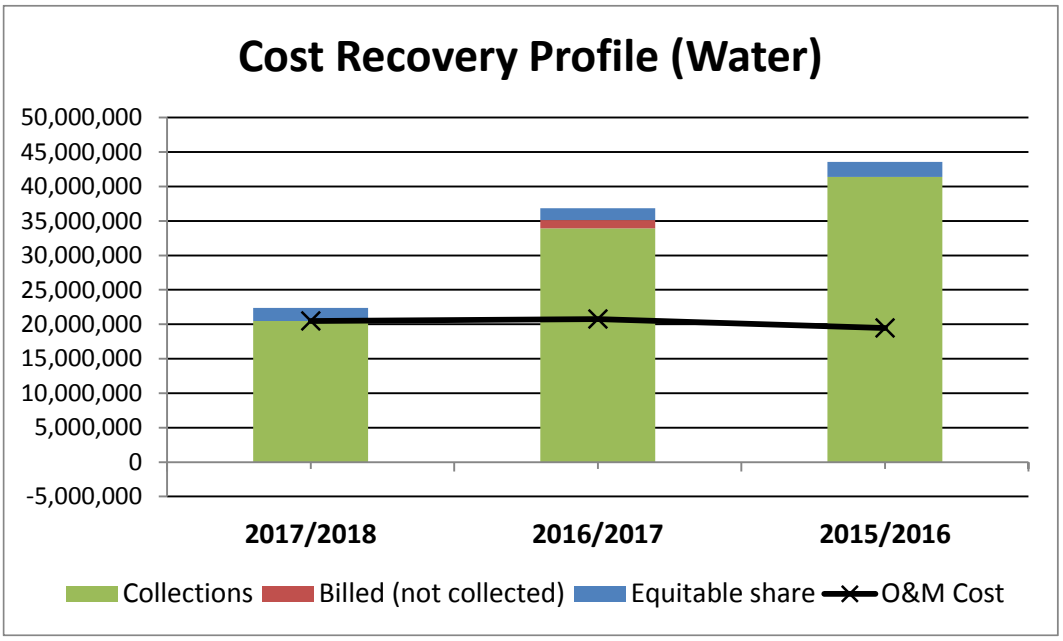


Figure C.3.3.1: Revenue collection and cost recovery profile (Water)

The figure below gives an overview of the revenue collection and cost recovery profile for wastewater services for Bergrivier Municipality.

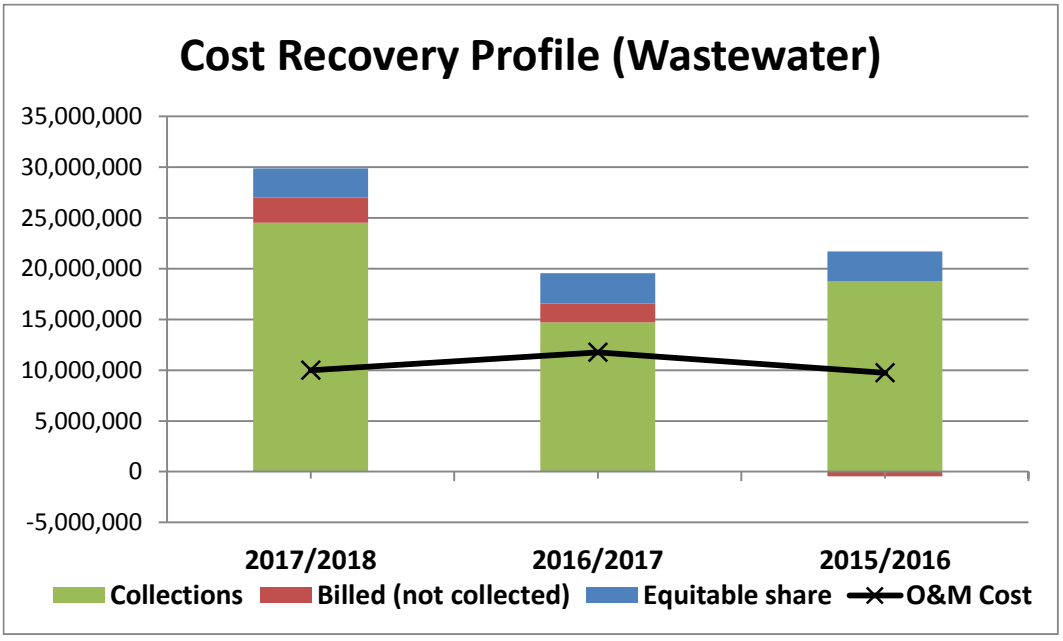


Figure C.3.3.2: Revenue collection and cost recovery profile (Wastewater)

Bergrivier Municipality's Operational and Maintenance Budget for water services for the four years up to 2016/2017 is summarised in the table below. A more detail breakdown of the water operational budgets are also included in Annexure E.

Table C.3.3.2: Operational and Maintenance budget for water services for the four years up to 2016/2017				
Description	**Record : Prior**			
	Actual 16/17	**Actual 15/16**	**Actual 14/15**	**Actual 13/14**
EXPENDITURE				
Employee Related Costs	R4 487 377-80	R3 687 337-17	R2 852 773-78	R2 512 220-73
Repairs and Maintenance	R534 540-55	R641 995-23	R867 445-65	R526 522-57
Capital Costs and Other	R921 025-50	R3 804 135-46	R3 571 610-79	R3 290 447-20
General Expenses	R14 829 418-49	R11 306 148-25	R10 330 814-92	R10 160 615-02
Total Expenditure	**R20 772 362-34**	**R19 439 616-11**	**R17 622 645-14**	**R16 489 805-52**
INCOME				
Total Income	**-R35 105 263-77**	**-R41 302 944-69**	**-R38 793 306-82**	**-R21 182 113-66**
Nett Surplus / Deficit	**R14 332 901-43**	**R21 863 328-58**	**R21 170 661-68**	**R4 692 308-14**

The 2017/2018 Operational and Maintenance Budget for water services is summarised in the table below:

Table C.3.3.3: Operational and Maintenance budget for water services for 2017/2018		
Cost Centre	**Cost Centre**	**Actual 17/18**
EXPENDITURE		
Water Distribution	4511	R17 791 230
Water Treatment	4512	R2 687 305
Total Expenditure		**R20 478 535**
INCOME		
Water Distribution	4511	-R20 341 100
Total Income		**-R20 341 100**
Nett Surplus / Deficit		**R137 435**

Bergrivier Municipality's Operational and Maintenance Budget for sanitation services for the four years up to 2016/2017 is summarised in the table below. A more detail breakdown of the sanitation operational budgets is also included in Annexure E.

Table C.3.3.4: Operational and Maintenance budget for sanitation services for the four years up to 2016/2017				
Description	**Record : Prior**			
	Actual 16/17	**Actual 15/16**	**Actual 14/15**	**Actual 13/14**
EXPENDITURE				
Employee Related Costs	R2 056 728-70	R2 104 451-34	R1 884 958-33	R1 919 258-55
Repairs and Maintenance	R623 195-59	R500 008-61	R466 857-57	R310 615-04
Capital Costs and Other	R381 830-50	R3 638 885-17	R1 028 259-40	R2 498 102-46
General Expenses	R8 677 667-08	R3 485 384-03	R3 337 283-18	R3 632 017-36
Total Expenditure	**R11 739 421-87**	**R9 728 729-15**	**R6 717 358-48**	**R8 359 993-41**
INCOME				
Total Income	**-R16 578 073-16**	**-R18 266 193-46**	**-R18 005 379-38**	**-R27 065 082-86**
Nett Surplus / Deficit	**R4 838 651-29**	**R8 537 464-31**	**R11 288 020-90**	**R18 705 089-45**

The 2017/2018 Operational and Maintenance Budget for sanitation services is summarised in the table below:

Table C.3.3.5: Operational and Maintenance budget for sanitation services for 2017/2018		
Cost Centre	**Cost Centre**	**Actual 17/18**
EXPENDITURE		
Sewerage	4291	R6 861 154
Waste Water Treatment	4292	R3 125 975
Total Expenditure		**R9 987 129**
INCOME		
Sewerage	4291	-R27 018 427
Total Income		**-R27 018 427**
Nett Surplus / Deficit		**-R17 031 298**

The table below gives an overview of the analysis of the consumer debtors for the past eight financial years

Table C.3.3.6: Consumer debtors per service for the last eight financial years							
Year	**General debit/credit**	**Services: Old**	**Electricity**	**Water**	**Sewerage**	**Refuse Removal**	**Total**
2010/2011	-R1 042 318-28	R107 212-90	R7 293 471-51	R4 998 198-78	R4 143 848-04	R5 375 499-51	R20 875 912-46
2011/2012	-R1 118 140-39	R106 007-16	R6 598 115-16	R4 604 543-09	R3 139 549-26	R5 123 607-35	R18 453 681-63
2012/2013	-R1 048 856-15	R94 337-51	R6 575 726-66	R4 623 040-89	R3 572 291-82	R6 260 353-61	R20 076 894-34
2013/2014	-R1 420 973-12	R71 576-70	R8 640 727-30	R6 550 646-49	R4 286 155-33	R7 213 767-20	R25 341 899-90
2014/2015	-R2 235 527-48	R23 066-42	R8 263 989-97	R7 797 917-44	R4 977 280-90	R8 063 592-38	R26 890 319-63
2015/2016	-R2 238 376-49	R10 902-76	R7 538 802-32	R7 746 652-56	R4 732 364-99	R7 810 512-25	R25 600 858-39
2016/2017	-R2 068 504-90	R9 478-72	R8 184 231-09	R8 682 944-98	R5 924 987-56	R9 993 744-10	R30 726 881-55
2017/2018	-R4 106 808-50	R0	R8 926 044-36	R8 568 907-98	R7 278 300-88	R12 710 916-47	R33 377 361-19

C.4. Water Quality

C.4.1. Sampling Programme

Bergrivier Municipality continues with the implementation of their comprehensive drinking water sampling programme for their formal water supply schemes, which includes schemes supplied by surface water, groundwater and potable bulk water supplied by the West Coast District Municipality. The current compliance monitoring is done by an accredited external laboratory. The Municipality continuously strive to provide good quality water and strive to achieve Blue Drop Status for all their water supply networks.

The two tables below give an overview of the Bergrivier Municipality's water quality compliance sampling programmes for their networks and WTWs. The programmes were also compared with the actual compliance sample results included in Annexure D.

Table C.4.1.1: Sampling Programme for Potable Water Quality - Network								
Treated Water Schemes: Piketberg, Porterville, Eendekuil, Redelinghuys, Velddrif, Aurora								
Registered Sites per Scheme		Active (yes/no)			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2017/18	FY2016/17	FY2015/16		FY2017/18	FY2016/17	FY2015/16
	Piketberg Community Centre (WWBMPB-001)	Yes	Yes	Yes	**Microbiological (Health)**			
	Piketberg Municipal Offices (WWBMPB-003)	Yes	Yes	Yes	E.Coli (Count per 100 ml)	30	30	30
	Aurora Municipal Office (WWBMAU-001)	Yes	Yes	Yes				
	Eendekuil Municpal Office (WWBMEK-001)	Yes	Yes	Yes	**Aesthetic**			
	Porterville Municipal Office (WWBMPV-001)	Yes	Yes	Yes	Conductivity at 25°C (mS/m)	30	30	30
	Porterville Sew age Plant Drinking Water (WWBRPV-002)	Yes	Yes	Yes	Colour	30	30	30
	Porterville Biblioteek	Yes	Yes	-	Sodium as Na (mg/l)	-	-	30
	Redelinghuys Municipal Office (WWBMRH-001)	Yes	Yes	Yes	Total Dissolved Solids (mg/l)	30	30	30
	Velddrif Civic Centre (Noordhoek Saal)	Yes	Yes	Yes	Magnesium as Mg (mg/l)		30	30
	Velddrif Tap Unathi Spaza (WWBMVD-006)	-	-	Yes	Chloride as Cl- (mg/l)	-	-	30
	Velddrif Municipal Office	Yes	Yes	-	Potassium as K (mg/l)	-	-	30
	Velddrif Eigelaars Slaghuis	Yes	-	-	Zinc as Zn (mg/l)	-	-	30
					Ammonia Nitrogen as N (mg/l)	-	-	30
	Sampled but not on programme				Iron as Fe (µg/l)	-	-	30
	On programme but not sampled				Manganese as Mn (µg/l)	-	-	30
					Operational			
					pH at 25°C	30	30	30
					Turbidity	30	30	30
					Aluminium as Al (µg/l)	30	30	30
					Heterotrophic Plate Count count per 1ml	30	30	30
					Total Coliform Count per 100 ml	30	30	30
					Disinfectant Residual			
					Residual Chlorine	30	30	30
					Chemical (Health)			
					Fluoride as F (mg/l)	30	30	30
					Nitrate and Nitrite as N (mg/l)	-	-	30
					Nitrite as N (mg/l)	-	-	30
					Sulfate as SO4 (mg/l)	-	-	30
					Not in STD / Limit Set			
					Calcium as Ca (mg/l)	30	30	30
					Calcium Hardness (as CaCO3)	-	-	30
					Magnesium Hardness (as CaCO3)	-	-	30
					Alkalinity (as CaCO3)	30	30	30
					Total Hardness (as CaCO3)	30	30	30

Table C.4.1.2: Sampling Programme for Potable Water Quality - WTW								
Treated Water Schemes: Piketberg, Porterville, Eendekuil, Redelinghuys, Velddrif, Aurora, Dwarskersbos								
Registered Sites per Scheme		Active (yes/no)			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2017/18	FY2016/17	FY2015/16		FY2017/18	FY2016/17	FY2015/16
	Aurora - WTW Final (WWBRAU-003)	Yes	Yes	Yes	**Microbiological (Health)**			
	Eendekuil WTW Final (WWBREK-003)	Yes	Yes	Yes	E.Coli (Count per 100 ml)	30	30	30
	Piketberg WTW Final (WWBRPB-009)	Yes	Yes	Yes				
	Porterville WTW Final (WWBRPV-004)	Yes	Yes	Yes	**Aesthetic**			
	Redelinghuys WTW (WWBRPH-001)	Yes	Yes	Yes	Conductivity at 25°C (mS/m)	30	30	30
	Storage				Colour	30	30	30
	Dwarskersbos Reservoir (WWBRVD-009)	Yes	Yes	Yes	Sodium as Na (mg/l)	-	30	30
	Velddrif Reservoir (Reservoir 1)	Yes	Yes	Yes	Total Dissolved Solids (mg/l)	30	30	30
					Magnesium as Mg (mg/l)		30	30
	On programme but not sampled				Chloride as Cl- (mg/l)	-	30	30
	Sampled but not on programme				Potassium as K (mg/l)	-	-	30
					Zinc as Zn (mg/l)	-	-	30
	Chloride is also sampled in Piketberg, Eendekuil and Redelinghuys.				Ammonia Nitrogen as N (mg/l)	-	-	30
					Iron as Fe (µg/l)	-	-	30
	Sodium is not sampled in Aurora, Velddrif and Dwarskersbos				Manganese as Mn (µg/l)	-	-	30
					Operational			
					pH at 25°C	30	30	30
					Turbidity	30	30	30
					Aluminium as Al (µg/l)	30	30	30
					Heterotrophic Plate Count count per 1ml	30	30	-
					Total Coliform Count per 100 ml	30	30	30
					Disinfectant Residual			
					Residual Chlorine	30	30	30
					Chemical (Health)			
					Fluoride as F (mg/l)	30	30	30
					Nitrate and Nitrite as N (mg/l)	-	-	30
					Nitrite as N (mg/l)	-	-	30
					Sulfate as SO4 (mg/l)	-	-	30
					Not in STD / Limit Set			
					Calcium as Ca (mg/l)	30	30	30
					Calcium Hardness (as CaCO3)	-	-	30
					Magnesium Hardness (as CaCO3)	-	-	30
					Total Alkalinity (as CaCO3)	30	30	30
					Total Hardness (as CaCO3)	30	30	30

The table below indicates the compliance of the E.Coli monitoring frequency in the water distributions systems of Bergrivier Municipality, in terms of the minimum requirements of SANS 0241:2015 (Table 2). The period assessed was for samples taken from July 2017 to June 2018.

Table C.4.1.3: Bergrivier Municipality's compliance of the monthly E.Coli monitoring frequency in the water distributions systems in terms of the minimum requirements of SANS 241-2:2015 (Table 2).

Distribution System	Population served	Required number of monthly samples (SANS 241-2:2015: Table 2)	Average number of monthly microbiological compliance samples taken by the Bergrivier Municipality during 2017/2018
Porterville	7 716	2	9.4
Piketberg	13 598	2.7	12.0
Velddrif	14 764	3.0	12.2
Dwarskersbos	824	2	4.3
Aurora	614	2	8.6
Eendekuil	1 723	2	7.8
Redelinghuys	591	2	8.1
Total	**39 830**	**15.7**	**62.3**

It can be noted from the above table that the number of monthly E.Coli samples taken by the Municipality during the 2017/2018 financial year was more than the required number of samples for all the water distribution systems.

The table below gives an overview of Bergrivier Municipality's compliance sampling programme for wastewater (final effluent) quality, as compiled from the final effluent compliance sample results.

Table C.4.1.4: Sampling Programme for Wastewater Effluent Quality

Registered Sites		Active			Determinands per Category	Frequency (days)		
		Year 0	Year-1	Year-2		Year 0	Year-1	Year-2
#	Name	FY2017/18	FY2016/17	FY2015/16		FY2017/18	FY2016/17	FY2015/16
1	Dwarskersbos	Yes	Yes	Yes	**Microbiological**			
2	Eendekuil	Yes	Yes	Yes	E.Coli (count per 100mℓ)	-	-	30
3	Piketberg	Yes	Yes	Yes	Faecal Coliforms (count per 100mℓ)	30	30	-
4	Porterville	Yes	Yes	Yes				
5	Velddrif	Yes	Yes	Yes	**Chemical**			
					Ammonia Nitrogen (mg/ℓ as N)	30	30	30
					Nitrate Nitrogen (mg/ℓ as N)	30	30	30
					Nitrite Nitrogen (mg/ℓ as N)	30	30	-
					Ortho Phosphate (mg/ℓ as P)	30	30	30
					COD (mg/ℓ) Filtered	30	30	-
					COD (mg/ℓ) Unfiltered	30	30	30
					Free Chlorine (mg/ℓ)	30	30	30
					Physical			
					Electrical Conductivity (mS/m)	30	30	30
					pH	30	30	30
					Total Suspended Solids (mg/ℓ)	30	30	30

The table below gives an overview of the compliance of the Municipality with regard to their Water Quality and Wastewater Quality Sampling Programmes, as taken from the IRIS and GDS.

Table C.4.1.5: Compliance to the Sampling Programme (s)

Measurable / Enabling Factor	Unit	Year 0 FY2017/18					Year-1 FY2016/17				Year-2 FY2015/16			
		MAH	CAH	CCH	CNA	O	M	C	P	O	M	C	P	O
Potable Water Quality														
Supply system submissions	Nr registered	Data not available					6	6	6	6	6	6	6	6
	Nr submitted						6	6	6	6	6	6	6	6
	Annual %						100%	100%	100%	100%	100%	95%	100%	100%
Monitoring compliance	Average %						85%	65%	76%	62%	86%	64%	81%	62%
Data Credibility	Average %						100%	99%	100%	100%	94%	92%	92%	94%
BDS In-Time Submission	Annual %						98%	99%	98%	99%	88%	84%	80%	85%
Wastewater Quality														
Monitoring compliance	Average %	80%					76%				79%			
Operational monitoring compliance	Average %	Not captured on GDS and recorded by Process Controllers at each of the WWTW												

Legend **MAH**: Microbiological Acute Health; **CAH**: Chemical Acute Health; **CCH**: Chemical Chronic Health; **CNA**: Chemical Non Health Aesthetic; **O**: Operational

The table below gives an overview of the water quality monitoring from the WSDP Guide Framework perspective.

Table C.4.1.6: Water Quality Monitoring Overview from WSDP Guide Framework Perspective					
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0	Year - 1	Year - 2
			FY2017/18	FY2016/17	FY2015/16
6.3	**Water Supply and Quality**				
6.3.2	Process Control in place	yes/total WTW in %	100%	100%	100%
6.3.3	Monitoring Programme in place	yes/total schemes in %	100%	100%	100%
6.3.4	Sample Analysis Credibility	Average %	100%	100%	100%
9.2	**Monitoring**				
9.2.1	% of water abstracted monitored: Surface water	Q monitored / Q abstracted in %	100%	100%	100%
9.2.2	% of water abstracted monitored: Ground water	Q monitored / Q abstracted in %	100%	100%	100%
9.2.3	% of water abstracted monitored: External Sources (Bulk purchase)	Q monitored own / Q purchased in %	100%	100%	100%
9.2.6	Water quality for formal schemes? (1: daily, 2: weekly, 3: monthly, 4: annually, 5: never)	frequency	Monthly	Monthly	Monthly
9.2.7	Water quality for rudimentary schemes? (1: daily, 2: weekly, 3: monthly, 4: annually, 5: never)	frequency	N/A	N/A	N/A
9.2.9	Is the number sufficient in accordance to the SANS241 requirements?	yes/no	Yes	Yes	Yes
9.3	**Water Quality**				
	Is there a water safety plan in place?	yes/no	Yes	Yes	Yes
9.3.1	Reporting on quality of water taken from source: urban & rural	yes/total schemes in %	100%	100%	100%
9.3.5	Quality of water taken from source: urban - % monitored by WSA self?	monitored by WSA / total schemes in %	100%	100%	100%
9.3.6	Quality of water taken from source: rural - % monitored by WSA self?	monitored by WSA / total schemes in %	N/A	N/A	N/A
9.3.9	Are these results available in electronic format?	yes/no	Yes	Yes	Yes

The table below gives an overview of the wastewater quality monitoring from the WSDP Guide Framework perspective.

Table C.4.1.7 : Wastewater Quality Monitoring Overview from WSDP Guide Framework Perspective					
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0	Year - 1	Year - 2
			FY2017/18	FY2016/17	FY2015/16
5.3.1	**Monitoring and Sample Failure**				
5.3.1.1	Compliance Monitoring: % of tests performed as required by general limits /special limits/ license requirements (Average % over previous 12 months)	Annual %	80%	76%	79%
5.3.1.2	Operational: % of tests performed as required by general limits /special limits/ license requirements (Average % over previous 12 months)	Annual %	Not captured on GDS and recorded by Process Controllers at each of the WWTW		
6.4	**Wastewater Supply and Quality**				
6.4.2	Process Control in place	yes/total WWTW in %	57%	57%	57%
6.4.3	Monitoring Programme in place	yes/total WWTW in %	78%	78%	78%
6.4.4	Sample Analysis Credibility	Average %	100%	100%	100%
9.2	**Monitoring**				
9.2.10	Is the number sufficient in accordance to licences?	yes/no	Yes	Yes	Yes
9.3	**Water Quality**				
	Is there a wastewater risk abatement plan in place?	yes/no	Yes	Yes	Yes
9.3.2	Monitor quality of water returned to the resource: urban	yes/total WWTW in %	Yes	Yes	Yes
9.3.3	Monitor quality of water returned to the resource: rural	yes/total WWTW in %	N/A	N/A	N/A
9.3.7	Quality of water returned to resource: urban - % monitored by WSA self?	monitored by WSA / urban WWTW in %	Yes	Yes	Yes
9.3.8	Quality of water returned to resource: rural - % monitored by WSA self?	monitored by WSA / rural WWTW in %	N/A	N/A	N/A
9.3.9	Are these results available in electronic format?	yes/no	Yes	Yes	Yes

DWS's Blue Drop Process

The DWS launched the blue and green drop certification, with regard to drinking water quality and wastewater quality management, at the Municipal Indaba during September 2008. Blue drop status is awarded to those towns that comply with 95% criteria on drinking water quality management. The Blue Drop Certification programme is in its tenth year of existence and promised to be the catalyst for sustainable improvement of South African drinking water quality management in its entirety. The blue drop performance of Bergrivier Municipality is summarised as follows in the DWS's 2014 Blue Drop Report:

Table C.4.1.8: Blue Drop Performance of the Municipality (DWS's 2014 Blue Drop Report)	
Municipal Blue Drop Score	**2011 – 85.20%, 2012 – 90.60% and 2014 - 63.79%**

Regulatory Impression: The improvements observed in the previous assessments have not been demonstrated during this assessment cycle. A significant and substantial decrease in Municipal Score for Bergrivier Local Municipality is noted across each water system.

A number of areas are identified where the Bergrivier Local Municipality and their bulk water supplier for Velddrif, the West Coast District Municipality, should implement actions to improve compliance. These include:

- The system specific Water Safety Plan should be informed by the recommendations of the process audit, the results of the full SANS assessment of the raw, final water and distribution system, operational and compliance monitoring and non-conformance to the water quality limits. The Municipality is encouraged to align their Water Safety Plan for Velddrif with the Water Safety Plan for the Withoogte WTW managed by the West Coast District Municipality, which has not been updated since 2011. Evidence of the planning process and implementation of corrective actions to mitigate significant risks, should be maintained.
- Based on the water quality monitoring data, a risk based monitoring programme that complies with the requirements of SANS 241 with regard to sampling points and coverage of the distribution system, frequency of analyses and the determinants analysed, should be developed and implemented.
- The IMP should be updated to be risk based and aligned with limits set out in the latest version of SANS:241. This must be communicated to all relevant stakeholders to ensure the appropriate response to any incidents.
- All compliance monitoring data should be timeously uploaded to the BDS.
- Budget and expenditure information should be compiled for each water system.
- Operational flows at the treatment plants should be recorded daily and monitored against design capacity.
- Water balances should be completed for each water system and initiatives developed and implemented to reduce non-revenue water.

Of concern is the poor microbiological compliance in the systems of Eendekuil, Piketberg and Redelinghuys. This needs to be addressed urgently to ensure that water supplied to the community meets the drinking water quality criteria to prevent health impacts. High failures of turbidity, aluminium and residual chlorine levels indicate that improved operational practices may be required.

Based on the above Audit results, the DWS has serious concerns on the poor microbiological drinking water quality and the resultant risk to consumers of the Eendekuil, Piketberg and Redelinghuys water supply systems. These concerns have to be addressed as a matter of urgency and drinking water quality results and appropriate actions must be communicated to consumers should the water be found to be unfit for human consumption.

The Bergrivier Local Municipality was well prepared for the assessment and demonstrated a positive approach to the Blue Drop Certification Programme. Consequently, it is anticipated that through acknowledgement of the identified gaps that progressive improvement in compliance will once again be achieved in future assessments.

Site Inspection Report: Piketberg and Porterville WTWs Score:

Piketberg WTW: 87%

Porterville WTW: 85%

The site inspection impression at the Piketberg WTW was considered to be very good. Areas for improvement include the installation of standby equipment for flocculent dosing and chlorination.

The site inspection impression at the Porterville WTW was considered to be very good.						
Performance Area	**Aurora**	**Eendekuil**	**Piketberg**	**Porterville**	**Redelinghuys**	**Velddrif**
Water Services Provider(s)	**Bergrivier LM**	**Bergrivier LM**	**Bergrivier LM**	**Bergrivier LM**	**Bergrivier LM**	**West Coast DM**
Water Safety Planning	24.85	21.18	24.33	22.40	23.63	18.99
Treatment Process Management	6.80	4.00	6.00	6.80	6.00	6.00
DWQ Compliance	23.25	6.75	6.75	22.65	6.75	24.23
Management Accountability	7.30	7.30	7.75	7.75	7.75	7.60
Asset Management	5.78	4.41	5.25	8.33	4.41	7.11
Use Efficiency, Loss Management	0.23	0.23	0.23	0.23	0.23	0.23
Bonus Scores	2.86	6.75	6.71	4.78	6.00	4.57
Penalties	1.50	1.32	0.00	0.00	0.00	1.75
Blue Drop Score (2014)	**69.56%**	**49.29%**	**57.01%**	**72.93%**	**54.76%**	**66.96%**
Blue Drop Score (2012)	90.98%	90.16%	87.52%	95.00%	73.34%	97.57%
Blue Drop Score (2011)	77.88%	76.15%	68.78%	78.21%	52.69%	93.15%
Blue Drop Score (2010)	58.69%	57.81%	62.19%	62.19%	54.19%	67.38%
System Design Capacity (Ml/d)	0.200	0.200	3.000	3.900	0.300	75.400
Operational Capacity (% i.t.o. Design)	100%	80%	71%	36%	NI	80%
Average daily consumption (l/p/d)	30.8	266.7	214.1	175.0	500.0	N/A
Microbiological Compliance (%)	**99.9%**	**80.0%**	**90.9%**	**99.9%**	**82.6%**	**98.8%**
Chemical Compliance (%)	**99.9%**	**99.9%**	**99.9%**	**99.9%**	**99.9%**	**99.9%**

Table C.4.1.9: DWS's 2014 Blue Drop Risk Ratings for Bergrivier Municipality

Municipal Blue Drop Risk Rating	**52%**

The overall 2014 Risk Rating for Bergrivier is 52%, which translates into the 9th worst performance (or position 17 out of 25 WSAs) in the Western Cape. Note that this value is based on the 3 specific areas indicated below and shows concerns (medium to critical risks) for Process Control (which risks reflect compliance in terms of draft Regulation 813) in 4 of the 6 systems; Drinking Water Quality in 3 out of the 6 systems; and Risk Management in none of 6 systems.

Assessment Area	**Aurora**	**Eendekuil**	**Piketberg**	**Porterville**	**Redelinghuys**	**Velddrif**
2014						
Blue Drop Risk Rating (2014)	**51.2%**	**52.0%**	**65.8%**	**52.2%**	**76.3%**	**32.2%**
Process Control RR	64.7%	47.1%	64.1%	62.2%	82.4%	43.9%
Drinking Water Quality RR	40.7%	70.4%	70.4%	40.7%	70.4%	40.7%
Risk Management RR	34.8%	34.8%	34.8%	34.8%	34.8%	39.1%

Table C.4.1.9: DWS's 2014 Blue Drop Risk Ratings for Bergrivier Municipality						
Municipal Blue Drop Risk Rating						52%
2013						
Blue Drop Risk Rating (2013)	**31.3%**	**55.6%**	**50.3%**	**36.9%**	**56.7%**	**13.2%**
Process Control RR	41.2%	76.5%	56.4%	48.6%	58.8%	31.7%
Drinking Water Quality RR	11.1%	11.1%	40.7%	11.1%	40.7%	11.1%
Risk Management RR	73.9%	73.9%	82.6%	73.9%	82.6%	30.4%
2012						
Blue Drop Risk Rating (2012)	**54.1%**	**66.0%**	**80.2%**	**62.8%**	**63.9%**	**78.3%**
Process Control RR	76.5%	94.1%	94.9%	78.4%	76.5%	80.5%
Drinking Water Quality RR	11.1%	11.1%	11.1%	11.1%	33.3%	11.1%
Risk Management RR	52.2%	43.5%	52.2%	52.2%	52.2%	21.7%

The average daily consumption (l/p/d) for the last four financial years are summarised in the table below:

Table C.4.1.10: Average residential daily consumption (l/p/d) for the last four financial years.

Distribution System	2014/2015			2015/2016			2016/2017			2017/2018		
	Estimated Permanent Population	Aver. Daily Billed Metered Res. & Comm. Consump-tion (kl)	Aver. Daily consumption (l/p/d)	Estimated Permanent Population	Aver. Daily Billed Metered Res. & Comm. Consump-tion (kl)	Aver. Daily consumption (l/p/d)	Estimated Permanent Population	Aver. Daily Billed Metered Res. & Comm. Consump-tion (kl)	Aver. Daily consumption (l/p/d)	Estimated Permanent Population	Aver. Daily Billed Metered Res. & Comm. Consump-tion (kl)	Aver. Daily consumption (l/p/d)
Porterville	7 379	1 013	**137**	7 490	944	**126**	7 602	923	**121**	7 716	790	**102**
Piketberg	12 814	1 579	**123**	13 070	1 505	**115**	13 332	1 411	**106**	13 598	990	**73**
Velddrif *	12 754	1 976	**155**	13 391	2 086	**156**	14 061	2 332	**166**	14 764	1 621	**110**
Dwarskersbos *	743	212	**285**	769	223	**290**	796	207	**260**	824	136	**165**
Aurora	596	103	**173**	601	104	**173**	607	88	**145**	614	63	**103**
Eendekuil	1 624	125	**77**	1 656	135	**82**	1 689	138	**82**	1 723	99	**57**
Redelinghuys	583	89	**153**	586	79	**135**	588	84	**143**	591	62	**105**
All Systems	**36 493**	**4 947**	**136**	**37 563**	**5 262**	**140**	**38 675**	**5 262**	**136**	**39 830**	**3 783**	**95**

Note: * The average residential billed metered consumptions in the above table for Velddrif and Dwarskersbos are for the period July to June each financial year, excluding the period November to February.

DWS's Green Drop Process

The DWS also completed their Third Order Assessment of Municipal Waste Water Treatment Plants, DWS's Green Drop Report for 2013, which provides a scientific and verifiable status of municipal wastewater treatment. Green drop status is awarded to those WSAs that comply with 90% criteria on key selected indicators on wastewater quality management. The green drop performance of Bergrivier Municipality is summarised as follows in the DWS's 2013 Green Drop Report:

Table C.4.1.11: Green Drop Performance of the Municipality (DWS's 2013 Green Drop Report)	
Average Green Drop Score	**2009 – 11.00%, 2011 – 70.00%, 2013 - 44.21%**

Regulatory Impression: Bergrivier Local Municipality's performance is not on par with the Regulator's expectations. The significant decline in the municipal Green Drop score from 70% (2011) to 44.2% indicates that the gains of 2011 have not been carried forward. The Regulator finds it hard to justify the current performance of the municipality, given that a skilled and competent supervisory structure is in place, albeit shortcomings in the support structures were observed. The score awarded to Bergrivier also impacts on the Provincial Green Drop score for Western Cape, and the municipality is to realise that not only does the score fails the good that has been done in the municipality, but also in the region.

The Green Water Services Audit revealed substantial shortcomings in the areas of risk- and asset management, as well as effluent quality. As risk management and effluent quality comprises of 45% of the total Green Drop score, this is possibly the areas that the municipality need to focus going forward. The mismatch between the good site inspection score 79% and the 62% Green Drop score (see Porterville site assessment) suggest that the municipality has indeed evidence of good practice, but that such evidence has not been organised to represent the municipality to its full potential. The Regulatory wish to encourage the municipality to return to its previous benchmark and build on the good work previously achieved.

The decline in the Green Drop score is reflected in the CRR ratings as well, with 2 plants having moved from a low risk to a high-risk position.

Green Drop findings:

1. Three (3) of five (5) plants do not keep operational logbooks at the sites, whilst two (2) plants do not have O&M manuals in place
2. Despite good registration status of supervisor/s, the Process Controllers category is lacking.
3. Two (2) of the plants do not have evidence of design capacity and are not monitoring the inflow to the plants, which compromise the daily operation of the plants and medium term forward planning. The awarding of -40% attest to the seriousness of this default
4. Despite a good attempt to maintain best practice in compliance monitoring, none of the systems have succeeded in presenting operational monitoring regimes. This in part, could be the reason why better effluent quality has not been achieved.
5. The W_2RAP has been drafted, but is of sub-standard quality and does not represent a forward thinking and acting process to guide planning and implementation actions and resources. No incident management protocol is available. No signature by the Municipal Manager and/or CFO could be presented.
6. All systems failed in terms of asset registers, condition of assets, as well as cost pertaining to collection and treatment of sewage in the municipality. This again affects the ability to set tariffs and enhance revenue practices.
7. Four (4) of five (5) systems failed in terms of proof that pump stations are being maintained, and that all wastewater reaches the treatment plant.

Site Inspection Score: Porterville WWTW 70%

GREEN DROP REPORT CARD					
Key Performance Area	**Porterville**	**Dwarskersbos**	**Velddrif**	**Eendekuil**	**Piketberg**
Process Control and Maintenance Skills	**76**	**42**	**56**	**42**	**71**
Monitoring Programme	**83**	**83**	**75**	**59**	**88**
Submission of Results	**100**	**100**	**100**	**100**	**100**
Effluent Quality Compliance	**66**	**10**	**10**	**10**	**34**
Risk Management	**25**	**25**	**25**	**25**	**25**
Local Regulation	**24**	**24**	**24**	**24**	**24**
Treatment Capacity	**66**	**-40**	**66**	**-40**	**26**
Asset Management	**38**	**13**	**13**	**13**	**13**
Bonus Scores	7.54	6.75	9.63	2.07	9.09
Penalties	3.48	3.60	3.60	3.60	3.60
Green Drop Score (2013)	**62.60%**	**32.48%**	**40.91%**	**24.23%**	**48.94%**
Green Drop Score (2011)	**81.50%**	**73.30%**	**58.40%**	**38.00%**	**73.80%**
Green Drop Score (2009)	**16.60%**	**11.00%**	**5.00%**	**NA (0%)**	**11.00%**
System Design Capacity (Ml/d)	1.088	NI (1)	0.97	NI (1)	3.15
Capacity Utilisation (% ADWF i.t.o. Design Capacity)	66.36%	151.00%	60.00%	151.00%	74.29%
Resource Discharged into	Golf course	Golf course	Golf course	Golf course	Golf course

GREEN DROP REPORT CARD					
Key Performance Area	**Porterville**	**Dwarskersbos**	**Velddrif**	**Eendekuil**	**Piketberg**
Microbiological Compliance	83.33%	75.00%	41.67%	58.33%	50.00%
Chemical Compliance	93.75%	70.83%	29.17%	29.17%	68.75%
Physical Compliance	100.00%	33.33%	61.11%	75.00%	91.67%
Overall Compliance	94.79%	57.29%	42.71%	50.00%	75.00%
Wastewater Risk Rating (2012)	**41.20%**	**52.90%**	**58.80%**	**58.80%**	**58.80%**
Wastewater Risk Rating (2013)	**41.18%**	**76.47%**	**58.82%**	**76.47%**	**58.82%**

The 2014 Green Drop Risk Profile Progress Report of the DWS is further the product of a "gap" year, whereby progress is reported in terms of the improvement or decline in the risk position of the particular WWTW, as compare to the previous year's risks profile. This tool to collect, assess and report the risk profile is called the Green Drop Progress Assessment Tool (PAT). The PAT progress assessment period was done on compliance data and actions during 1 July 2012 – 30 June 2013, which represents the year immediately following the Green Drop 2013 assessment period. The results for Bergrivier Municipality were summarised as follow in DWS's 2014 Green Drop Risk Profile Progress Report.

Table C.4.1.12: DWS's 2014 Green Drop Risk Profile Progress Report results for Bergrivier Municipality					
Assessment Areas	**Porterville**	**Dwarskersbos**	**Velddrif**	**Eendekuil**	**Piketberg**
Technology	Activated sludge and mechanical aeration Lagoons	Anaerobic ponds/ Facultative ponds Anaerobic digestion	Biological (trickling) filters Anaerobic digestion	Anaerobic ponds/ Facultative ponds Anaerobic digestion	Activated sludge and mechanical aeration Lagoons
Design Capacity (Ml/d)	1.2	0.294	0.97	0.14	3.15
Operational flow (% of Design Capacity)	66.7%	17.0%	63.9%	71.4%	62.2%
Microbiological Compliance	75.0%	33.0%	8.0%	33.0%	50.0%
Chemical Compliance	83.3%	62.5%	27.0%	33.3%	56.3%
Physical Compliance	97.3%	39.0%	53.0%	64.0%	89.0%
Annual Average Effluent Quality Compliance	**85.2%**	**44.8%**	**29.3%**	**43.4%**	**65.1%**
Wastewater Risk Rating (%CRR/CRR$_{max}$)	**41.2%** (↓)	52.9% (↑)	58.8% (↓)	58.8% (↓)	58.8% (↓)
Highest Risk Area	Effluent quality	Low flow to plant	Effluent quality (disinfection)	Effluent / sludge management	Effluent quality / sludge management
Risk Abatement Process	Final W$_2$RAP	Final W$_2$RAP	Final W$_2$RAP	Final W$_2$RAP	Final W$_2$RAP
Capital & Refurbishment expenditure in 2010/2011	R 100 000	R 0	R 300 000	R 0	R 8 087 000
Description of Projects' Expenditure	Replace and repair aerators/pumps	N/A	Replace sewerage pumps and install new telemetry	N/A	Upgrade of WWTW to double up the capacity
Wastewater Risk Abatement Planning	Bergrivier produced a simple W$_2$RAP in-house which uses the CRR 2009 as baseline values and then identify the risks and mitigation measures to reduce the various elements of the CRR (A,B,C,D) in the period >2010. Further work would be required to add more intelligence to the approach, however, this provides for a meaningful 1st phase to risk abatement,				
Additional Notes	Significant effort has been made to address key risk areas, as can be seen by the allocation of financial resources.				

Regulatory Impression

The municipality was well prepared and aim to raise the Green Drop score by a further 10% (from 72%) for the 2012/13 year. Upgrades to the systems have been made, resulting in improved compliance at most plants. However, the Velddrif and Eendekuil plants are not meeting standards. A W$_2$RAP is in place and are being implemented to ensure that high-risk areas are abated. Flows are monitored at each site, with the exception of Dwarskersbos, which receive low flow to the pond system. All indicators are that Berg River is showing PROGRESS against the CRR rating over the 2011 to 2012 assessment year. The team is congratulated for their preparedness and positive contribution to the PAT assessments.

C.4.2. Water Quality Compliance

The table below gives an overview of Bergrivier Municipality's water quality compliance, as taken from the BDS.

Table C.4.2.1: Overview of Water Quality Compliance

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2017/18					Year-1 FY2016/17				Year-2 FY2015/16			
			MAH	CAH	CCH	CNA	O	M	C	P	O	M	C	P	O
	Results per the Blue Drop System														
n/a	Analysis compliance	Total	Data not available					567	878	930	1513	485	21442	878	1336
n/a		Nr Failures						24	28	27	144	53	135	12	140
n/a		Compliance %						96%	97%	97%	90%	89%	99%	99%	90%
n/a	Samples frequency	Total						546	360	364	543	481	342	335	482
n/a		Nr Failures						24	11	25	129	53	8	11	120
n/a		Compliance %						96%	97%	93%	76%	89%	98%	97%	75%
n/a	Sites compliance	Total						199	195	196	200	190	176	176	190
n/a		Nr Failures						22	10	24	92	38	8	10	89
n/a		Compliance %						89%	95%	88%	54%	80%	95%	94%	53%
6.3	**Water Supply and Quality**														
6.3.6	Blue Drop Status	last year certified by DWS	New Blue Drop PAT still to be done					New Blue Drop Assessment still to be done				Results of Blue Drop PAT are not yet available			
9.3	**Water Quality**														
9.3.10	% Time (days) within SANS 241 standards per year	Average of analysis compliance %	Data not available					95%				94%			

Legend **MAH**: Microbiological Acute Health; **CAH**: Chemical Acute Health; **CCH**: Chemical Chronic Health; **CNA**: Chemical Non Health Aesthetic; **O**: Operational

The table below gives an overview of the number of compliance samples taken over the period July 2017 to June 2018 for the various water distribution networks.

Table C.4.2.2: Number of water quality compliance samples taken throughout the various water distribution systems over the period July 2017 to June 2018

Number of Sampling points of Bergrivier Municipality within the distribution systems (WTW Included)	4	3	4	2	2	2	2
Parameter Sampled	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**
Conductivity	45	36	50	14	25	24	25
Total Alkalinity (as $CaCO_3$)	44	35	49	13	24	23	24
Aluminium (as Al)	89	72	95	26	49	47	49
Colour	13	36	50	14	25	24	25
Total Hardness (as $CaCO_3$)	44	35	49	13	24	23	24
Magnesium (as Mg)	45	36	50	14	25	24	25
Total Dissolved Solids	13	36	50	14	25	24	25
Turbidity	89	72	95	26	49	47	49
pH (at 25°C)	89	72	95	26	49	47	49
Free Chlorine	89	72	95	26	47	47	49
Calcium (as Ca)	45	34	50	14	25	24	24
E.Coli	113	144	146	51	103	94	97
Heterotrophic Plate Count	113	144	146	50	103	94	97
Total Coliform Count	25	74	52	27	55	48	50
Chloride (as Cl)	1	14	1	1	1	13	13
Sodium (as Na)	13	14	1	1	1	13	13
Fluoride (as F)	57	37	46	13	25	24	25
Potassium (as K)	1	1	1	1	1	1	1
Zinc (as Zn)	1	1	1	1	1	1	1
Ammonia Nitrogen (as N)	1	1	1	1	1	1	1
Combined Nitrate plus Nitrite	1	1	1	1	1	1	1
Nitrate & Nitrite Nitrogen (as N)	1	1	1	1	1	1	1
Nitrate as N	1	1	1	1	1	1	1

Table C.4.2.2: Number of water quality compliance samples taken throughout the various water distribution systems over the period July 2017 to June 2018							
Number of Sampling points of Bergrivier Municipality within the distribution systems (WTW Included)	4	3	4	2	2	2	2
Parameter Sampled	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**
Nitrite as N	1	1	1	1	1	1	1
Sulphate (as $SO4^{2-}$)	1	1	1	1	1	1	1
Iron (as Fe)	13	1	1	1	1	1	1
Manganese (as Mn)	13	1	1	1	1	1	1
Antimony (as Sb)	1	1	1	1	1	1	1
Arsenic (as As)	1	1	1	1	1	1	1
Cadmium (as Cd)	1	1	1	1	1	1	1
Chromium (as Cr)	1	1	1	1	1	1	1
Copper (as Cu)	1	1	1	1	1	1	1
Lead (as Pb)	1	1	1	1	1	1	1
Mercury (as Hg)	1	1	1	1	1	1	1
Nickel (as Ni)	1	1	1	1	1	1	1
Selenium (as Se)	1	1	1	1	1	1	1
Uranium (as U)	1	1	1	1	1	1	1
Cyanide	1	1	1	1	1	1	1
Total Organic Carbon	1	1	1	1	1	1	1
Chloroform	1	1	1	1	1	1	1
Bromoform	1	1	1	1	1	1	1
Dibromochloromethane	1	1	1	1	1	1	1
Bromodichloromethane	1	1	1	1	1	1	1
Combined Trihalomethanes	1	1	1	1	1	1	1
Microcystin	1	1	1	1	1	1	1
Phenols	1	1	1	1	1	1	1
Somatic Coliphages	1	1	1	1	1	1	1
Giardia Species	1	1	1	1	1	1	1
Cryptosporidium Species	1	1	1	1	1	1	1
Monochloramine	1	1	1	1	1	1	1
Barium	1	1	1	1	1	1	1
Baron	1	1	1	1	1	1	1
Total number of samples	**986**	**998**	**1 155**	**378**	**690**	**675**	**698**

The water quality compliance sample results are included in Annexure D for each of the distribution systems. The overall percentage of compliance of the water quality samples taken over the period July 2017 to June 2018 is summarised in the table below per distribution system (SANS 241: 2015 Limits).

Table C.4.2.3: Percentage compliance of the water quality samples for the period July 2017 to June 2018			
Performance Indicator	**Performance Indicator categorised as unacceptable Yes / No (Table 4 of SANS 241-2:2015)**	**% Sample Compliance according to SANS 241-2015 Limits**	**Frequency of Additional Monitoring due to failure (Table 3 of SANS 241-2:2015)**
Porterville			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	No (Excellent)	99.1%	-
Chronic Health	No (Excellent)	100.0%	-
Aesthetic	No (Good)	92.7%	-
Operational Efficiency	No (Excellent)	99.7%	-
Piketberg			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	Yes (Unacceptable)	91.8%	Monthly

Table C.4.2.3: Percentage compliance of the water quality samples for the period July 2017 to June 2018			
Performance Indicator	**Performance Indicator categorised as unacceptable Yes / No (Table 4 of SANS 241-2:2015)**	**% Sample Compliance according to SANS 241-2015 Limits**	**Frequency of Additional Monitoring due to failure (Table 3 of SANS 241-2:2015)**
Chronic Health	Yes (Unacceptable)	87.2%	Monthly
Aesthetic	No (Excellent)	93.3%	-
Operational Efficiency	No (Excellent)	94.1%	-
Dwarskersbos			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	No (Good)	96.2%	-
Chronic Health	No (Excellent)	96.8%	-
Aesthetic	No (Excellent)	98.2%	-
Operational Efficiency	No (Good)	92.5%	-
Velddrif			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	Yes (Unacceptable)	91.9%	Monthly
Chronic Health	No (Good)	93.3%	-
Aesthetic	No (Excellent)	96.5%	-
Operational Efficiency	No (Excellent)	98.7%	-
Aurora			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	No (Excellent)	99.0%	-
Chronic Health	No (Excellent)	100.0%	-
Aesthetic	No (Excellent)	99.0%	-
Operational Efficiency	No (Excellent)	94.8%	-
Eendekuil			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	No (Excellent)	100.0%	-
Chronic Health	No (Excellent)	100.0%	-
Aesthetic	No (Excellent)	94.9%	-
Operational Efficiency	No (Excellent)	99.1%	-
Redelinghuys			
Acute Health Chemical	No (Excellent)	100.0%	-
Acute Health Microbiological	Yes (Unacceptable)	92.9%	Monthly
Chronic Health	No (Excellent)	95.9%	-
Aesthetic	No (Excellent)	96.6%	-
Operational Efficiency	No (Excellent)	97.3%	-

The table below gives an overview of the five categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified:

Table C.4.2.4.: Four categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified	
Category	**Risk**
Acute Health	Determinand that poses an immediate unacceptable health risk if present at concentration values exceeding the numerical limits specified in this part of SANS 241.
Aesthetic	Determinand that taints water with respect to taste, odour and colour and that does not pose an unacceptable health risk if present at concentration values exceeding the numerical limits specified in SANS 241.
Chronic Health	Determinand that poses an unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits specified in SANS 241.
Operational	Determinand that is essential for assessing the efficient operation of treatment systems and risks from infrastructure

The table below gives an overview of Bergrivier Municipality's wastewater quality compliance, as taken from the GDS.

Table C.4.2.5: Overview of Wastewater Quality Compliance															
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2017/18				Year-1 FY2016/17				Year-2 FY2015/16			
			M	C	P	O	M	C	P	O	M	C	P	O
	Results per the Green Drop System													
n/a	Regulatory compliance	Total	-	-	-	-	-	-	-	-	-	-	-	-
n/a		Nr Failures	-	-	-	-	-	-	-	-	-	-	-	-
n/a		Compliance %	56%	56%	58%	N/A	18%	31%	42%	N/A	56%	67%	55%	N/A
n/a	Operational compliance	Total	Not captured on GDS and recorded by Process Controllers at each of the WWTW											
n/a		Nr Failures												
n/a		Compliance %												
5.3.1	**Monitoring and Sample Failure**													
5.3.1.3 5.3.1.4 5.3.1.5	Average % of sample failure	Failure %	44%	44%	42%	N/A	82%	69%	58%	N/A	44%	33%	45%	N/A
6.3	**Water Supply and Quality**													
6.4.6	Green Drop Status	last year certified by DWS	New Green Drop Assessment still to be done				Green Drop PAT still to be done				New Green Drop Assessment still to be done			

Legend **M**: Microbiological; **C**: Chemical; **P**: Physical; **O**: Operational

The final effluent quality compliance sample results are included in Annexure D for each of the WWTWs. The overall Microbiological, Chemical and Physical compliance percentages of the final effluent samples taken over the last three financial years at the Dwarskersbos-, Eendekuil-, Piketberg-, Porterville- and Velddrif WWTW is summarised in the table below (General Limits):

Table 4.2.6: Percentage Microbiological (Faecal Coliforms) Compliance of the Compliance Samples Taken at the Various WWTWs for the Last Three Financial Years			
WWTW	**2017/2018**	**2016/2017**	**2015/2016**
Dwarskersbos	100.0%	100.0%	100.0%
Eendekuil	100.0%	100.0%	100.0%
Piketberg	81.8%	83.3%	100.0%
Porterville	66.7%	75.0%	81.8%
Velddrif	100.0%	100.0%	100.0%
Total	**90.0%**	**91.7%**	**96.6%**

Table 4.2.7: Percentage Chemical Compliance of the Compliance Samples Taken at the Various WWTWs for the Last Three Financial Years															
WWTW	2017/2018					2016/2017					2015/2016				
	Ammonia	Nitrites & Nitrates	COD	Ortho Phosphate	Overall	Ammonia	Nitrites & Nitrates	COD	Ortho Phosphate	Overall	Ammonia	Nitrites & Nitrates	COD	Ortho Phosphate	Overall
Dwarskersbos	N/A	N/A	84.6	N/A	**84.6**	N/A	N/A	83.3	N/A	**83.3**	N/A	N/A	0.0	N/A	**0.0**
Eendekuil	N/A	N/A	25.0	N/A	**25.0**	N/A	N/A	33.3	N/A	**33.3**	N/A	N/A	41.7	N/A	**41.7**
Piketberg	90.9	81.8	100.0	100.0	**93.2**	100.0	83.3	83.3	100.0	**91.7**	100.0	100.0	91.7	100.0	**97.9**
Porterville	25.0	100.0	91.7	50.0	**66.7**	58.3	100.0	83.3	100.0	**85.4**	90.9	100.0	100.0	100.0	**97.7**
Velddrif	100.0	83.3	91.7	33.3	**77.1**	83.3	91.7	66.7	66.7	**77.1**	100.0	58.3	100.0	75.0	**83.3**
Total	**71.4**	**88.6**	**78.3**	**60.0**	**75.2**	**80.6**	**91.7**	**70.0**	**88.9**	**81.0**	**97.1**	**85.7**	**66.1**	**91.2**	**82.2**

Table 4.2.8: Percentage Physical Compliance of the Compliance Samples Taken at the Various WWTWs for the Last Three Financial Years												
WWTW	2017/2018				2016/2017				2015/2016			
	pH	Electrical Conductivity	Total Suspended Solids	Overall	pH	Electrical Conductivity	Total Suspended Solids	Overall	pH	Electrical Conductivity	Total Suspended Solids	Overall
Dwarskersbos	53.8	0.0	N/A	**26.9**	25.0	8.3	N/A	**16.7**	58.3	0.0	N/A	**29.2**
Eendekuil	100.0	100.0	N/A	**100.0**	100.0	100.0	N/A	**100.0**	100.0	100.0	N/A	**100.0**
Piketberg	100.0	63.6	81.8	**81.8**	100.0	66.7	91.7	**86.1**	100.0	100.0	91.7	**97.2**
Porterville	100.0	100.0	66.7	**88.9**	100.0	100.0	83.3	**94.4**	100.0	100.0	100.0	**100.0**
Velddrif	100.0	58.3	91.7	**83.3**	100.0	50.0	75.0	**75.0**	100.0	58.3	100.0	**86.1**
Total	**90.0**	**63.3**	**80.0**	**77.4**	**85.0**	**65.0**	**83.3**	**76.9**	**91.5**	**71.2**	**97.1**	**85.0**

C.4.3. Incident Management

Bergrivier Municipality's Maintenance Team mainly performs their own repair and preventative maintenance work to the equipment and infrastructure of the Municipality, except when specialised repair work is required, in which case the work is sub-contracted to approved sub-contractors on the municipal database.

Water Safety Plans for the various distribution systems are in place. W_2RAPs for the various WWTWs are also in place. The W_2RAP is an all-inclusive risk analysis tool by which risks associated with the management of collection, treatment and disposal of wastewater, are identified and rated (quantified). The identified risks can then be managed according to its potential impacts on the receiving environment / community / resource.

The Water Safety Plan and W_2RAP Teams of Bergrivier Municipality are committed to meet regularly to review the implementation of all the aspects of the Water Safety Plan and W_2RAP to ensure that they are still accurate and to determine whether the field assessments need updates or modifications and whether the Incident Response Management Protocol is still adequate. In addition to the regular three-year review, the Water Safety Plan and W_2RAP will also be reviewed when, for example, a new water source is developed, major treatment improvements are planned and brought into use, or after a major incident.

An Incident Response Management Protocol is in place and forms part of Bergrivier Municipality's Water Safety Plan and W_2RAP. The Incident Response Management Protocol entails that certain reactive procedures are followed when an incident occurs, such as when a malfunction of the treatment processes occurs due to power failures, faulty equipment, adverse weather conditions or human error.

Table C.4.3.1: Incident Management and Reporting Overview					
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0 FY2017/18	Year - 1 FY2016/17	Year - 2 FY2015/16
6.3	**Water Supply and Quality**				
6.3.1	Incident Management Protocol in place	yes/total schemes in %	Yes / 100%	Yes / 100%	Yes / 100%
6.3.5	Failure Response Management in place	yes/total schemes in %	Yes / 100%	Yes / 100%	Yes / 100%
6.4	**Waste Water Supply and Quality**				
6.4.1	Incident Management Protocol in place	yes/total schemes in %	Yes / 100%	Yes / 100%	Yes / 100%
6.4.5	Failure Response Management in place	yes/total schemes in %	Yes / 100%	Yes / 50%	Yes / 50%

Table C.4.3.2: Water Quality Incident Reporting Compliance (Health Oriented)										
Measurable / Enabling Factor	Unit	Year 0			Year-1			Year-2		
		FY2017/18			FY2016/17			FY2015/16		
		Acute Health Microbiological	Acute Health Chemical	Chronic Health	Acute Health Microbiological	Acute Health Chemical	Chronic Health	Acute Health Microbiological	Acute Health Chemical	Chronic Health
Failures in terms of Analysis	Total nr	762	42	736	686	42	845	532		803
	Nr of failures	35	0	31	54	0	6	63		6
	Failure %	4.6%	0.0%	4.2%	7.9%	0.0%	0.7%	11.8%		0.7%
	Nr reported	35	0	31	54	0	6	63		6
	Reported % of failure	100%	100%	100%	100%	100%	100%	100%		100%
Failures in terms of Samples	Total	762	42	736	686	42	845	532		803
	Nr of failures	35	0	31	54	0	6	63		6
	Failure %	4.6%	0.0%	4.2%	7.9%	0.0%	0.7%	11.8%		0.7%
	Nr reported	35	0	31	54	0	6	63		6
	Reported % of failure	100%	100%	100%	100%	100%	100%	100%		100%
Failures in terms of Sites	Total	762	42	736	686	42	845	532		803
	Nr of failures	35	0	31	54	0	6	63		6
	Failure %	4.6%	0.0%	4.2%	7.9%	0.0%	0.7%	11.8%		0.7%
	Nr reported	35	0	31	54	0	6	63		6
	Reported % of failure	100%	100%	100%	100%	100%	100%	100%		100%

C.5. Water Conservation and Water Demand Management

The table below gives an overview of the WC/WDM activities implemented by Bergrivier Municipality.

Table C.5.1: Overview of WC/WDM Activities

WSDP Ref. #	Regulations Ref. #	Description	Urban Settlements						Rural Settlements					
			Year 0		Year - 1		Year - 2		Year 0		Year - 1		Year - 2	
			2017/18		2016/17		2015/16		2017/18		2016/17		2015/16	
7.1.1	10.2.g.iii	**REDUCING UNACCOUNTED FOR WATER AND WATER INEFFICIENCIES**												
		Number of customers where the following activities have been pursued:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.1.1		Night flow metering	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.1.2		Day flow metering	8,906	100%	8,854	100%	8,721	100%	0	0%	0	0%	0	0%
7.1.1.3		Reticulation leaks fixed	Unknown	Unknown	Unknown	Unknown	Unknown	100%	0	0%	0	0%	0	0%
7.1.1.4		Illegal connections formalized	0	0%	0	100%	0	100%	0	0%	0	0%	0	0%
7.1.1.5		Un-metered connections, metered	0	0%	0	100%	0	100%	0	0%	0	0%	0	0%
7.1.2	10.2.g.iii	**REDUCING HIGH PRESSURES FOR RESIDENTIAL CONSUMERS**												
		Number of residential consumers with water supply pressure of:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.2.1		< 300 kPa	5,121	57.5%	5,091	57.5%	5,015	57.5%	0	0%	0	0%	0	0%
7.1.2.2		300 kPa - 600 kPa	1,122	12.6%	1,116	12.6%	1,099	12.6%	0	0%	0	0%	0	0%
7.1.2.3		600 kPa - 900 kPa	2,262	25.4%	2,249	25.4%	2,215	25.4%	0	0%	0	0%	0	0%
7.1.2.4	10.2.b.iii	> 900 kPa	401	4.5%	398	4.5%	392	4.5%	0	0%	0	0%	0	0%
7.1.3	10.2.g.iii	**LEAK AND METER REPAIR PROGRAMMES**												
		Number of consumer units targeted by:	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.3.1		Leak repair assistance programme	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.3.2	10.2.g.iv	Retro-fitting of water inefficient toilets	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.3.3		Meter repair programme	616	7%	257	3%	137	2%	0	0%	0	0%	0	0%
7.1.4	10.2.g.iii	**CONSUMER / END-USE DEMAND MANAGEMENT: PUBLIC INFO AND EDUCATION PROGRAMMES**												
			Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total	Nr	% of total
7.1.4.1		Number of schools targeted by education programmes	10	50%	10	50%	10	50%	0	0%	0	0%	0	0%
7.1.4.2		Number of consumers (people) targeted by public information programmes	8,906	100%	8,854	100%	8,721	100%	0	0%	0	0%	0	0%

Quantity of water unaccounted for (Ml/year):

Bergrivier Municipality's WC/WDM Strategy was updated during 2014/2015 and was previously approved by Council in 2013. The average annual growth percentage in total raw water requirements for Bergrivier Municipality over the period 2010/2011 to 2017/2018 was -5.66 %/a. The table below gives a summary of the internal NRW for the various distribution systems in Bergrivier Municipality's Management Area (System Input Volume – Billed Metered Consumption).

Table C.5.2: Internal Non-revenue water and ILI for the various distribution systems

Description	Unit	17/18	Record : Prior (Ml/a)					
			16/17	15/16	14/15	13/14	12/13	11/12
Porterville	Volume	18.704	97.301	97.391	122.740	64.188	57.359	77.961
	Percentage	5.3%	19.5%	18.9%	22.1%	13.9%	12.3%	16.4%
	ILI	**0.47**	**2.50**	**2.57**				
Piketberg	Volume	50.231	93.754	69.401	75.956	171.938	137.581	157.934
	Percentage	9.5%	11.3%	8.3%	9.0%	20.5%	17.2%	19.4%
	ILI	**0.63**	**1.17**	**0.85**				
Velddrif	Volume	5.184	44.615	103.854	158.547	80.910	82.753	10.066
	Percentage	0.8%	4.5%	10.4%	17.8%	9.1%	9.1%	1.9%
	ILI	**0.08**	**0.90**	**2.19**				
Dwarskersbos	Volume	5.928	0.172	4.860	-0.073	7.806	17.381	4.796
	Percentage	10.0%	0.2%	4.7%	-0.1%	7.5%	17.5%	5.1%
	ILI	**1.15**	**0.00**	**0.85**				
Aurora	Volume	4.408	10.345	1.090	-3.388	5.572	-0.887	-5.448
	Percentage	15.8%	20.2%	2.3%	-8.2%	13.1%	-2.3%	-13.6%
	ILI	**0.44**	**1.03**	**0.03**				
Eendekuil	Volume	22.223	27.450	26.295	12.584	-7.452	7.033	0.101
	Percentage	31.2%	28.8%	27.0%	15.6%	-12.0%	9.1%	0.1%
	ILI	**4.05**	**4.96**	**4.69**				
Redelinghuys	Volume	8.235	11.059	19.753	21.917	24.531	23.314	24.820
	Percentage	23.3%	22.5%	35.7%	36.5%	39.6%	39.9%	40.3%
	ILI	**3.16**	**4.25**	**7.33**				
Total	**Volume**	**114.913**	**284.696**	**322.644**	**388.283**	**347.493**	**324.534**	**270.230**
	Percentage	**6.72%**	**10.90%**	**12.13%**	**15.14%**	**14.13%**	**13.24%**	**10.93%**
	ILI	**0.53**	**1.34**	**1.54**				

Note: Infrastructure Leakage Index (ILI) for Developed Countries = **1 – 2 Excellent (Category A)**, **2 – 4 Good (Category B)**, **4 – 8 Poor (Category C)** and > **8 – Very Bad (Category D)**

Category A = No specific intervention required.

Category B = No urgent action required although should be monitored carefully.

Category C = Requires attention

Category D = Requires immediate water loss reduction interventions

The Infrastructure Leakage Index (ILI) is also included in the above table, which is the most recent and preferred performance indicator for comparing leakage from one system to another. It is a non-dimensional index representing the ratio of the current real leakage and the "Unavoidable Annual Real Losses". A high ILI value indicates a poor performance with large potential for improvement while a small ILI value indicates a well-managed system with less scope for improvement. The parameters used to calculate the ILIs for the various distribution systems are included in the Models in Annexure B. Attaining an ILI = 1 is a theoretical limit which is the minimum water loss in an operational water reticulation system. A value of less than 1 should not occur since this implies that the actual leakage is less than the theoretical minimum level of leakage.

Number of consumers connected to a water reticulation system where pressures rise above 900 kPa at the consumer connection are as follows:

A large section of the water network in the Municipal area consists of ageing Asbestos Cement (AC) pipes, which is a significant contributing factor in causing leaking and bursting of water pipes. Approximately 60% of Redelinghuys, 55% of Porterville, 71% of Eendekuil and 50% of Dwarskersbos water network consist of AC pipes. The Municipality is replacing these pipes with uPVC pipes on an ongoing basis subject to the availability of funds.

The table below indicate the potential savings on bulk water supply for each town within the Bergrivier Management Area, through the implementation of pressure management. The towns that should consider pressure management as a measure of water demand management (where the % potential saving > 3% of the total water demand), as identified in the Bergrivier Municipality WDM Strategy developed by CES, are also indicated in the table below.

Table C.5.3: Potential savings on bulk water supply through the implementation of pressure management and the existing average operating pressures, static pressures and residual pressures in the various towns

Town (Average Operating Pressure)	WDM Strategy Febr. 2008		Water Master Plan June 2015	
	Saving Potential (Ml/year)	Pressure Management Priority	Static Pressures	Residual Pressure
Porterville (48m)	13.520 (3%)	Low	No areas where pressures exceed 90m.	Within the 24m – 90m criteria for the complete town.
Piketberg (63m)	33.572 (6%)	Medium	Large area where the pressure exceed 90m. 1) Most of the region east of Lang Street, excluding the three areas with PRVs. 2) The lower end of the pumped supply zone on the western edge of Buitengracht Street.	Pressure higher than 90m: 1) Industrial area east of the N7 near Piketco. 2) Triangular area at the intersection of Ou Hoof- and Die Trek streets on the west side of the N7, only lower end of Hoop Street. 3) The northern part of the fountain supply pipe, Waterkant Street, no user connections on this pipe. Pressure lower than 24m: 1) Supply to the school along upper Kloof Street, a large user. 2) Supply to the sports ground east of Lang Street, an un-metered connection. 3) At the intersection between Buitengracht street and Tilla lane, close to 24m.
Wittewater (51m)	-	-	No areas where pressures exceed 90m. Static pressure below 24m occurs on the northern edge of the west bank side (reaching 13m) and the eastern road on the east bank (18m).	Residual pressures follow the same pattern with the northern edge of the west bank side (reaching 12m) and the eastern road on the east bank (17m)
Goedverwacht (48m)	-	-	No areas where pressures exceed 90m.	Well within the design limits.
Velddrif (26m)	50.244 (6%)	Medium	No areas where pressures exceed 90m.	Pressure lower than 24m at the following areas: 1) Laaiplek / Harbour area reaching a lowest pressure of 17.5m at River Street. 2) The network upgrading since the 2005 water master plan relieved the previous low pressure experienced in Port Owen area.
Dwarskersbos (19m)	-	-	No areas where pressures exceed 90m. Static pressure below 24m occurs for the complete Dwarskersbos. If the booster pump is directed to the network instead of the water tower alone, static pressure can go as high as 36m over the entire network.	Below the design criteria level for the complete town. The pressure drops to 22m at the northern edge of town in the new Kersbos development, which is the furthest from the pressure tower.

Table C.5.3: Potential savings on bulk water supply through the implementation of pressure management and the existing average operating pressures, static pressures and residual pressures in the various towns				
Town (Average Operating Pressure)	**WDM Strategy Febr. 2008**		**Water Master Plan June 2015**	
	Saving Potential (Ml/year)	**Pressure Management Priority**	**Static Pressures**	**Residual Pressure**
Aurora (55m)	4.282 (10%)	High	No areas where pressures exceed 90m.	Below the design criteria level at the north-eastern corner. The pressure drops to 10m.
Eendekuil (32m)	0 (0%)	Low	No areas where pressures exceed 90m.	Below the design criteria level for most of the southern and eastern higher lying areas. The pressure drop to 7.5m at the eastern edge of town.
Redelinghuys (5m without booster)	6.351 (11%)	High	No areas where pressures exceed 90m.	Below 24m in almost 60% of the town. The lowest pressure (16.5m) occurs at the southern corner of the town. Even the topographically lowest north-western corner of town has a residual pressure of 23.5m indicating that friction losses are the main concern.

The updated Water Master Plans will be consulted in conjunction with the WC/WDM Strategy to identify further areas where pressure reduction can be implemented.

Demand management activities undertaken:

Bergrivier Municipality's try to keep their water losses below 10%, as indicated in their WC/WDM Strategy. Bergrivier Municipality has no dedicated funding for WC/WDM measures, but most of the current WC/WDM measures are done through the Municipality's O&M budget. The Municipality focussed during the last financial year mostly on the replacement of old residential water meters and their pipeline replacement programme. PRVs are also in place in Porterville and Piketberg to reduce pressures within the various networks and all water pump stations are provided with standby pumps. Two new PRVs were installed in Piketberg during the 2015/2016 financial year. A new PRV was also installed in Porterville during 2016/2017. Internal plumbing leaks are also repaired at low-income households on an ad-hoc basis.

The proposed WC/WDM measures, as included in the WC/WDM Strategy, include the following measures to keep water losses and NRW as low as possible:

- Reduce number of estimates or try to never estimate values;
- Budget to replace old asbestos pipelines (Plot areas with the highest number of pipe bursts and use IMQS (database system) to identify specific areas)
- Implementation of pressure management measures (Pressure management systems / Taps)
- Water meter audit – To determine which meters need to be replaced first, as well as determining the age and the accuracy of the meters.
- The use of telemetry systems and the correct installation of telemetry systems at strategic places (Data collection / monitoring, improved metering system and control, accurate flow monitoring, early warning system).
- Replacement of bulk, industrial and residential water meters on a regular basis.
- Ensure all Municipal buildings are metered, as well as public open spaces (If not known, determine and budget / install).
- Monthly reporting is important.

- The logical identification of zones and the installation of bulk and residential water meters for monitoring, specific in problematic areas.
- Raise public awareness on WC/WDM measures (Pamphlets, Schools, Notice signs that indicate savings / losses.
- Try continuously to improve timelines for the calculation of losses (administrative losses).
- Install data loggers to determine MNFs in order to identify areas with high water losses.

Bergrivier Municipality received R1.65 million funding from the DWS during the 2015/2016 financial year for the implementation of WC/WDM measures (ACIP funding). The following interventions were done for Porterville, Redelinghuys and Piketberg:

Porterville

- Leak detection on existing water network in highest pressure zone within Porterville;
- Visit 917 houses to determine, on-site, visible water leaks;
- Install bulk water meter at filtration plant;
- Install bulk water meter PRV in Malan Street;
- Inspect PRV with associated pressure reduction measures; and
- Consumer meter replacement.

Redelinghuys

- Replace water meter in water pump station;
- Replace bulk water meter at reservoir; and
- Manufacture and replace leaking water manifold between water pumps in pump house.

Piketberg

- Supply three bulk water meters to the Municipality for fitment; and
- Inspect PRV and pressure reduction measures.

The following EPWP projects were implemented during the 2017/2018 financial year.

- Plumbers were appointed to fix leaks and replace faulty plumbing equipment in Porterville.
- Alien vegetation was cleared at Porterville.

Progress made with the installation of water efficient devices:

No further progress was made during the last financial year on the installation of water efficient devices at the various municipal buildings.

C.6. Water Services Infrastructure Management

Bergrivier Municipality's Asset Register needs to be updated to include the CRC of all the water and sewerage infrastructure. The Municipality also needs to ensure that all the existing water and sewerage infrastructure are included in the Asset Register. The tables below give an overview of the water and sewerage assets currently included in the Asset Register.

Water Infrastructure: The opening costs and book values of the water infrastructure included in Bergrivier Municipality's current Asset Register is summarised in the table below (June 2018):

Table C.6.1: Opening costs and book values of the water infrastructure

Asset Type	Opening Costs	Book Values	% Book Values / Opening Costs
Boreholes	R782 843	R166 188	21.23%
Reticulation Pipeline	R32 408 636	R23 108 652	71.30%
Pump Station	R9 007 698	R6 025 841	66.90%
Reservoir	R16 257 764	R12 714 226	78.20%
Water Meter	R973 613	R694 767	71.36%
WTW	R15 350 109	R10 923 834	71.16%
Total	**R74 780 663**	**R53 633 508**	**71.72%**

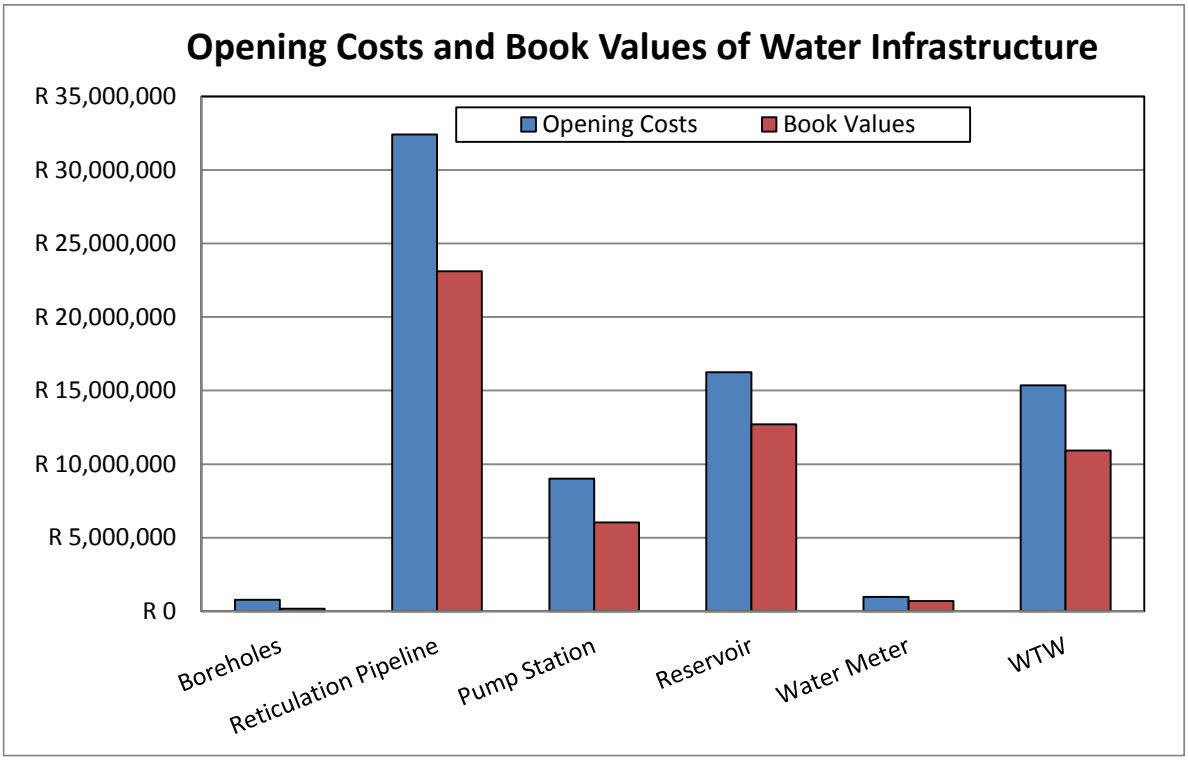


Figure C.6.1: Opening Costs and Book Values of the water infrastructure

The table and graph below give an overview of the remaining useful life by facility type for the water infrastructure:

Table C.6.2: Overview of the remaining useful life by facility type for water infrastructure (Opening Costs)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Boreholes	R612 443	R170 400	R0	R0	R0
Reticulation Pipeline	R20 000	R32 801	R8 883 086	R0	R23 472 748
Pump Station	R856 910	R2 253 817	R2 569 877	R0	R3 327 094
Reservoir	R88 474	R111 773	R9 478 954	R0	R6 578 563
Water Meter	R67 500	R862 900	R0	R0	R43 213
WTW	R520 387	R4 371 831	R6 881 760	R0	R3 576 130
Total	**R2 165 714**	**R7 803 522**	**R27 813 677**	**R0**	**R36 997 748**

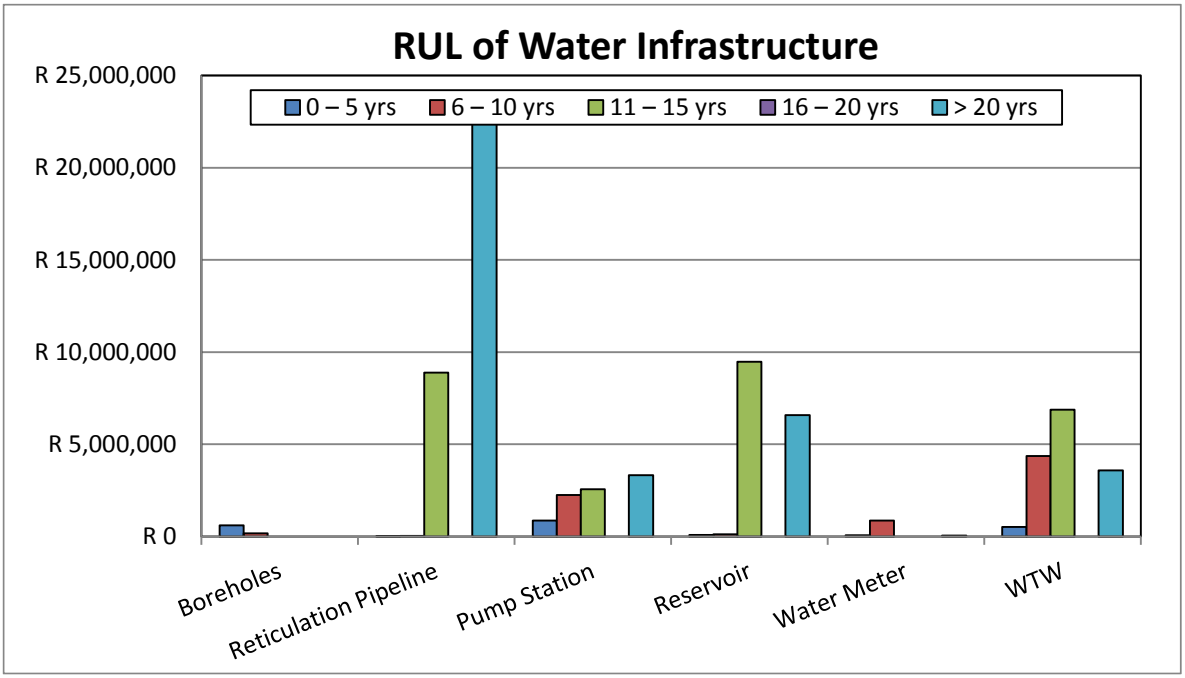


Figure C.6.2: Remaining Useful Life of the water infrastructure

The table and graph below give an overview of the age distribution by facility type for the water infrastructure (June 2018):

Table C.6.3: Overview of the age distribution by facility type for the water infrastructure (Opening Costs)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Boreholes	R170 400	R612 443	R0	R0	R0
Reticulation Pipeline	R7 961 707	R10 631 939	R0	R6 750 664	R7 064 327
Pump Station	R5 799 550	R2 303 145	R148 507	R756 497	R0
Reservoir	R10 506 854	R151 156	R49 091	R0	R5 550 662
Water Meter	R856 973	R116 640	R0	R0	R0
WTW	R7 378 566	R7 107 832	R128 859	R0	R734 851
Total	**R32 674 050**	**R20 923 155**	**R326 457**	**R7 507 161**	**R13 349 840**

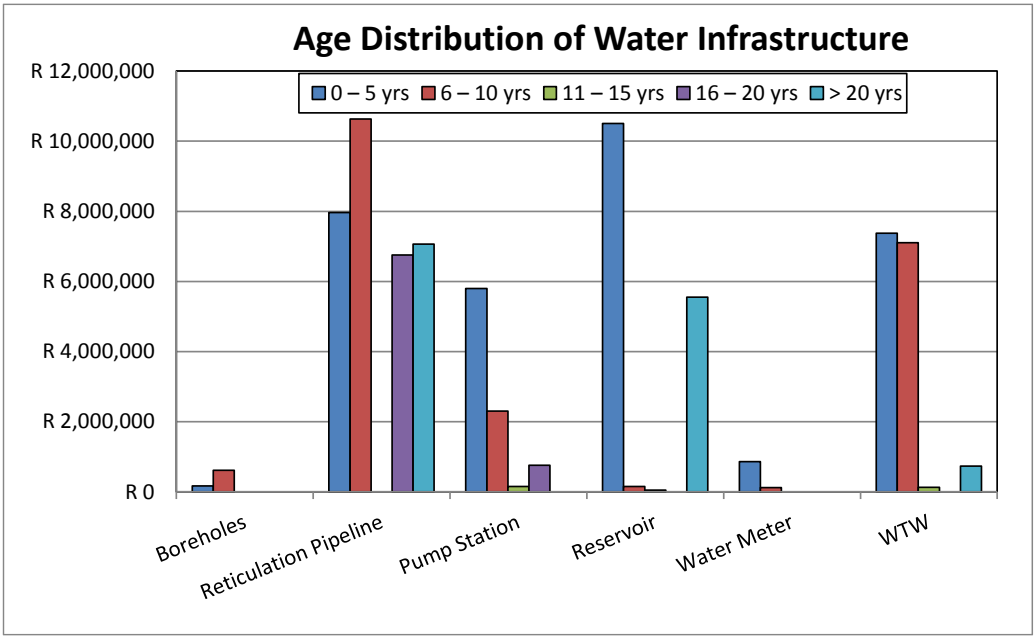


Figure C.6.3: Age distribution of the water infrastructure

The table and graph below give an overview of the condition grading per facility for the water infrastructure (June 2018):

Table C.6.4: Condition grading per water facility type (Opening Costs)

Asset Type	Very Good	Good	Fair	Poor	Very Poor
Boreholes	R349 943	R0	R22 770	R410 130	R0
Reticulation Pipeline	R8 715 430	R0	R11 771 676	R11 921 530	R0
Pump Station	R5 717 594	R0	R145 281	R3 144 824	R0
Reservoir	R10 535 396	R0	R0	R5 722 368	R0
Water Meter	R900 186	R0	R0	R73 427	R0
WTW	R9 316 413	R0	R0	R6 033 695	R0
Total	**R35 534 962**	**R0**	**R11 939 727**	**R27 305 974**	**R0**

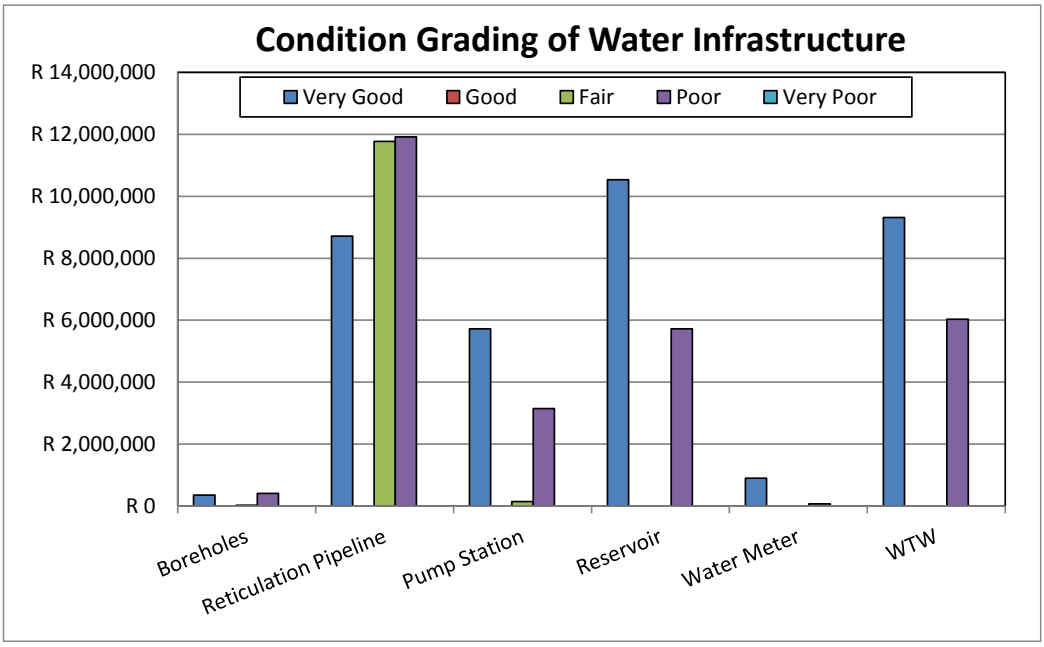


Figure C.6.4: Condition grading of the water infrastructure

Sewerage Infrastructure: The opening costs and book values of the sewerage infrastructure of Bergrivier Municipality is summarised in the table below (June 2018):

Table C.6.5: Opening costs and book values of all sewerage infrastructure			
Asset Type	**Opening Costs**	**Book Values**	**% Book Values / Opening Costs**
Sewer Pump Stations	R3 211 369	R1 605 239	49.99%
Sewer Reticulation Pipelines	R11 543 335	R7 450 450	64.54%
Porterville WWTW (0001)	R12 617 785	R10 204 482	80.87%
Velddrif WWTW (0002)	R31 411 315	R26 691 931	84.98%
Eendekuil WWTW (0003)	R138 232	R77 861	56.33%
Piketberg WWTW (0004)	R12 872 578	R6 361 231	49.42%
Septic Tanks	R129 443	R48 024	37.10%
Totals	**R71 924 057**	**R52 439 218**	**72.91%**

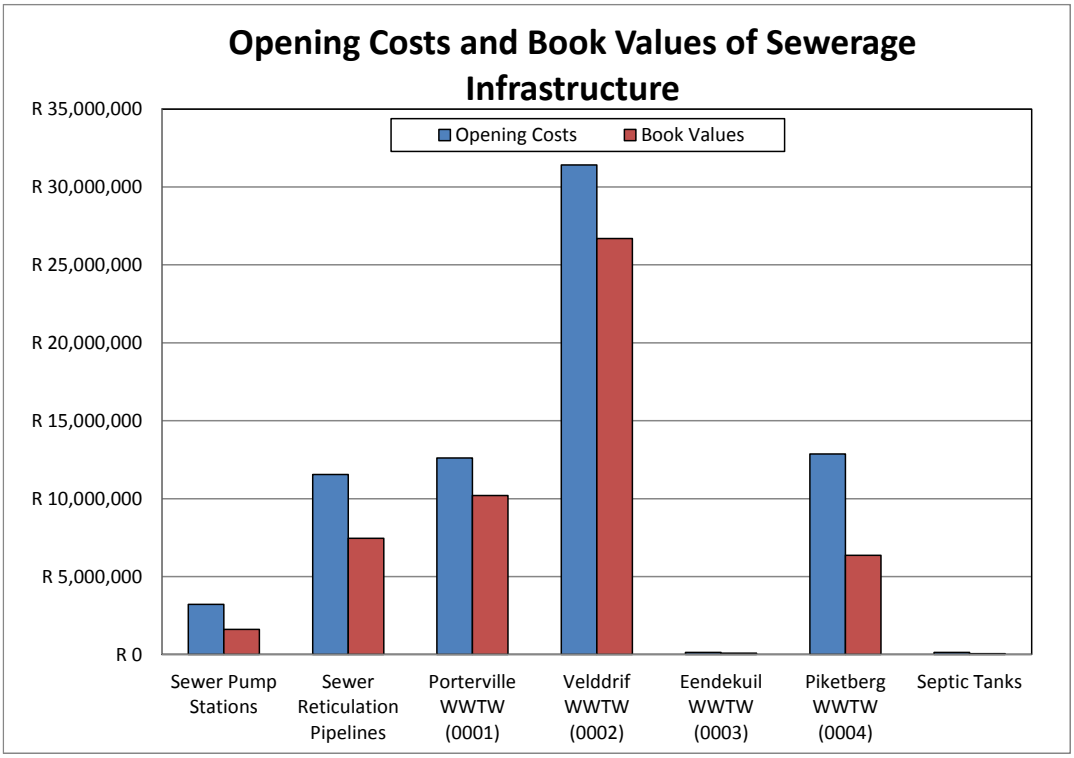


Figure C.6.5: Opening costs and book values of the sewerage infrastructure

The following tables and graphs give an overview of the remaining useful life by facility type for the sewerage infrastructure:

Table C.6.6: Overview of the RUL by facility type for the sewerage infrastructure (Opening Costs)					
Asset Type	**0 – 5 yrs**	**6 – 10 yrs**	**11 – 15 yrs**	**16 – 20 yrs**	**> 20 yrs**
Sewer Pump Stations	R1 419 137	R265 996	R410 234	R0	R1 116 001
Sewer Reticulation Pipelines	R0	R0	R0	R6 599 665	R4 943 670
Porterville WWTW (0001)	R163 150	R39 590	R1 019 482	R0	R11 395 563
Velddrif WWTW (0002)	R1 009 468	R917 679	R7 197 158	R0	R22 287 010
Eendekuil WWTW (0003)	R0	R0	R99 053	R0	R39 179
Piketberg WWTW (0004)	R194 729	R10 638 456	R19 629	R0	R2 019 764
Septic Tanks	R80 723	R0	R0	R0	R48 720
Totals	**R2 867 207**	**R11 861 721**	**R8 745 556**	**R6 599 665**	**R41 849 907**

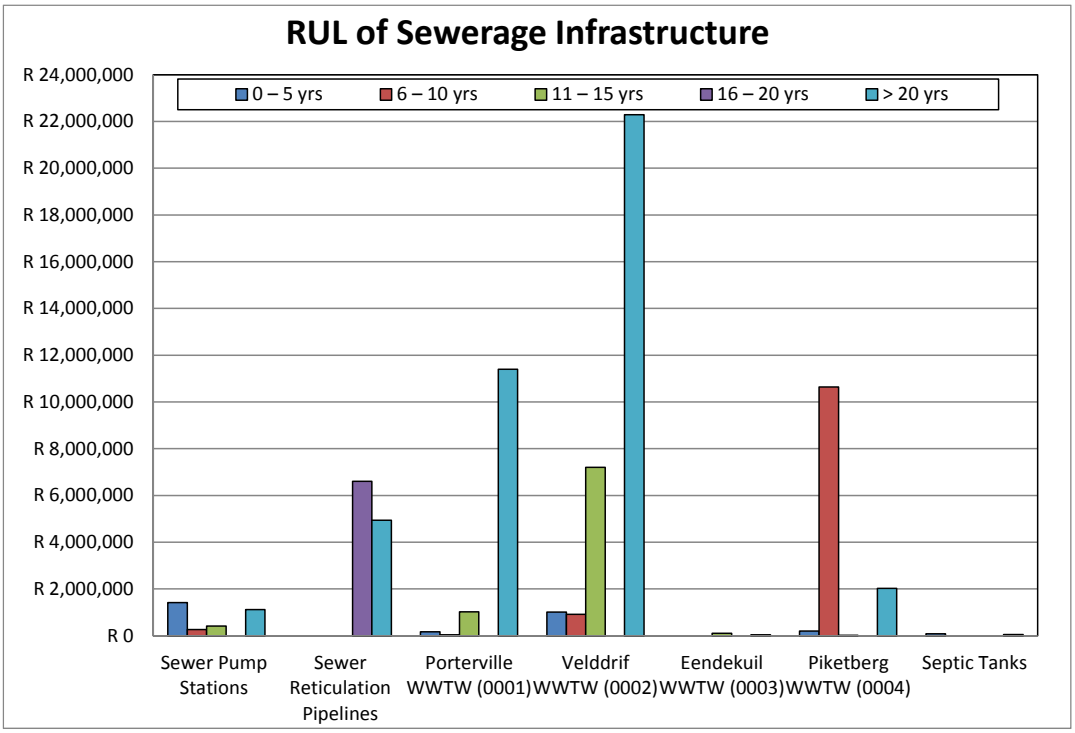


Figure C.6.6: Remaining Useful Life of the sewerage infrastructure

The table below give's an overview of the age distribution per facility for the sewerage infrastructure (June 2018):

Table C.6.7: Overview of the age distribution by facility type for the sewerage infrastructure (Opening Costs)

Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Sewer Pump Stations	R1 109 140	R249 379	R1 374 301	R0	R478 548
Sewer Reticulation Pipelines	R576 098	R4 861 276	R0	R0	R6 105 961
Porterville WWTW (0001)	R2 252 363	R9 444 622	R163 150	R120 372	R637 278
Velddrif WWTW (0002)	R27 791 487	R3 619 828	R0	R0	R0
Eendekuil WWTW (0003)	R39 179	R0	R0	R99 053	R0
Piketberg WWTW (0004)	R0	R11 511 660	R138 600	R19 629	R1 202 689
Septic Tanks	R129 443	R0	R0	R0	R0
Totals	**R31 897 710**	**R29 686 765**	**R1 676 051**	**R239 054**	**R8 424 476**

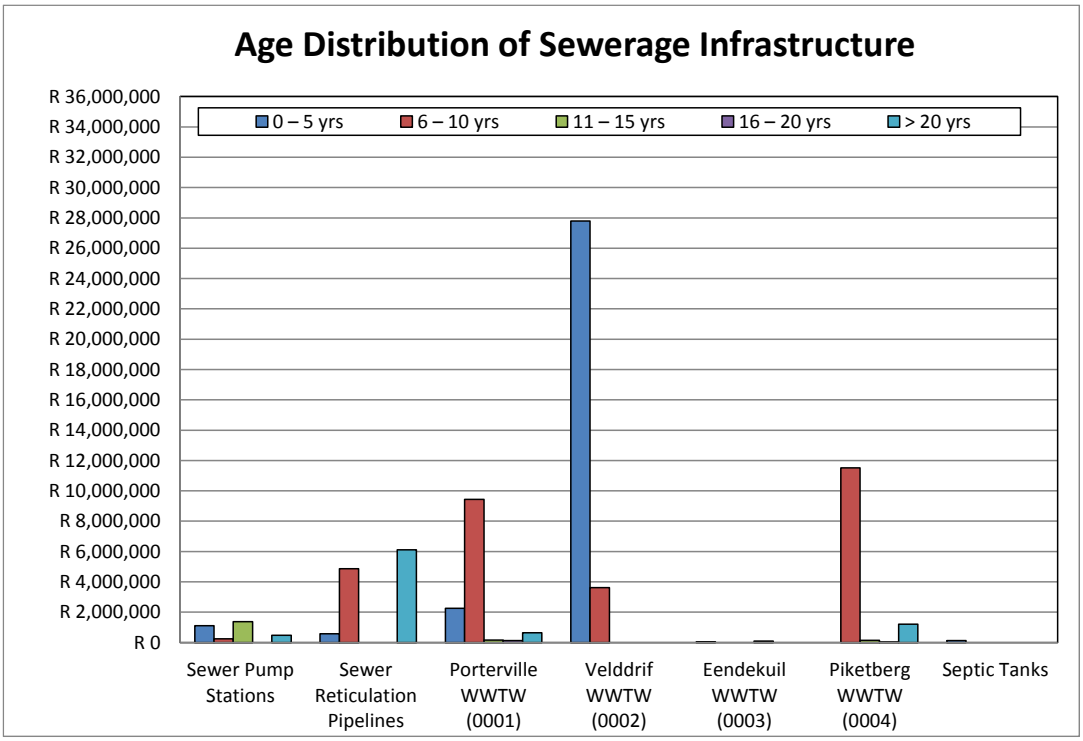


Figure C.6.7: Age distribution of the sewerage infrastructure

The table below give's an overview of the condition grading per facility for the sewerage infrastructure (June 2018):

Table C.6.8: Condition grading per sewer facility type (Opening Costs)

Asset Type	Very Good	Good	Fair	Poor	Very Poor
Sewer Pump Stations	R896 196	R0	R212 944	R2 102 229	R0
Sewer Reticulation Pipelines	R2 661 253	R2 001 383	R0	R6 880 699	R0
Porterville WWTW (0001)	R2 318 044	R0	R0	R10 299 741	R0
Velddrif WWTW (0002)	R27 957 438	R103 349	R0	R3 350 528	R0
Eendekuil WWTW (0003)	R39 179	R0	R0	R99 053	R0
Piketberg WWTW (0004)	R13 630	R	R9 714	R12 740 811	R108 423
Septic Tanks	R80 723	R0	R0	R48 720	R0
Totals	**R33 966 463**	**R2 104 732**	**R222 658**	**R35 521 781**	**R108 423**

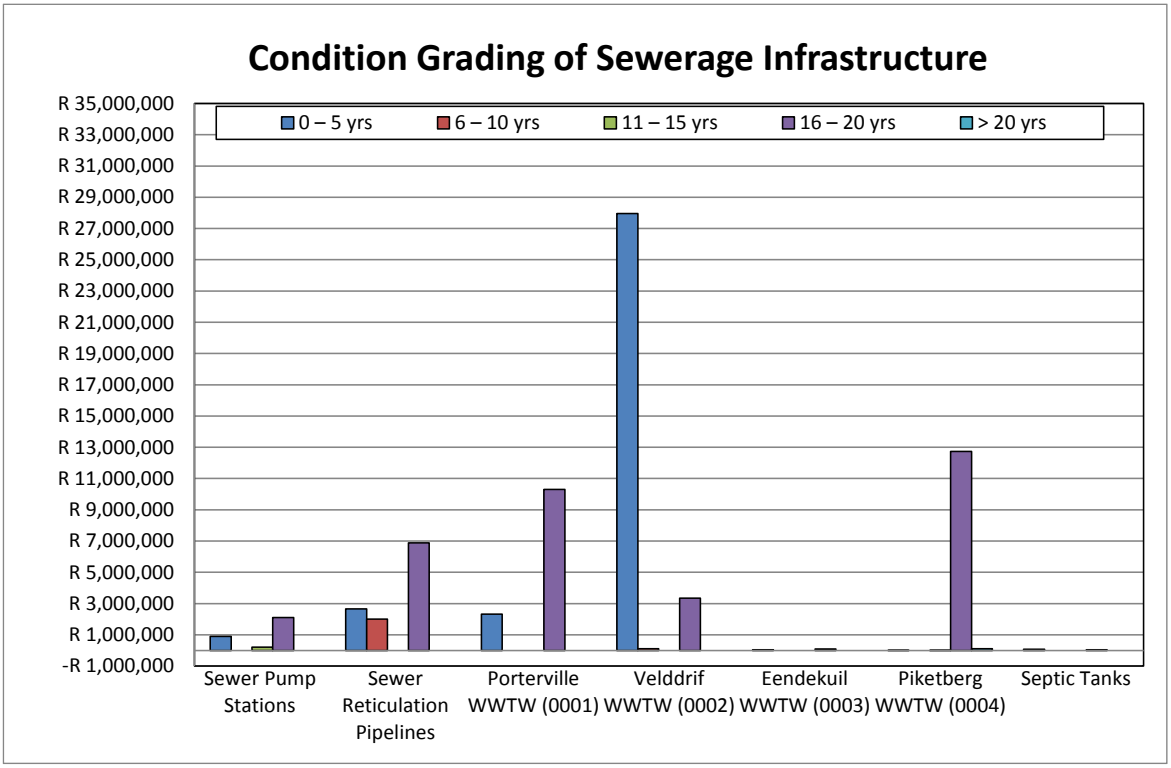


Figure C.6.8: Condition grading of the sewerage infrastructure

C.7. Associated Services

All schools and medical facilities in Bergrivier Municipality's Management Area are supplied with a higher level of water and sanitation service. The existing water and sanitation service levels for all the schools in the Bergrivier Municipality Management Area is summarised in the table below.

Table C.7.1: Service Levels at Schools

Associated Services Facility	Number of Facilities	Water			Sanitation		
		Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services	Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services
Schools	20	20	0	0	20	0	0

Source: Number of schools - Socio Economic Profile for Bergrivier Municipality, Western Cape Government, 2017

The existing water and sanitation service levels for all the Medical Facilities in Bergrivier Municipality's Management Area are summarised in the table below.

Table C.7.2: Service Levels at Medical Facilities

Associated Services Facility	Number of Facilities	Water			Sanitation		
		Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services	Facilities with Adequate Services	Facilities with no Services	Facilities with inadequate Services
District Hospitals	2	2	0	0	2	0	0
Clinics	3	3	0	0	3	0	0
Satelite / Mobile Clinics	7	7	0	0	7	0	0

Source: Number of facilities - Socio Economic Profile for Bergrivier Municipality, Western Cape Government, 2017

C.8. Water Resources

The Western Cape experienced a severe drought over the last three years, with some relief during the 2018 winter months. The drought reduced the safe yields of the Municipality's own existing surface and groundwater resources. WC/WDM measures to lower the future water requirements and the augmentation of the existing water resources with groundwater or other sources are therefore critical at this stage.

Water balance models were developed for each of the towns within Bergrivier Municipality's Management Area, which are included in Annexure A. Graphs of the total water requirements (bulk raw water volumes, system input volumes and billed metered consumption), peak month factors, annual NRW per town and water usage per sector are included in Annexure A.

Future water requirement projection models were developed for each of the towns within Bergrivier Municipality's Management Area and are included in Annexure C. The table below gives an overview of the years in which the annual water requirement will exceed the allocations, licences or sustainable yields from the various resources.

Table C.8.1: Years in which the annual water requirement will exceed the allocations / licences / yields from the various water resources

Distribution System	Allocation (A) / Yield (Y) / Licence (L) (Ml/a)	Annual Growth on 2017/2018 requirement (%)	Annual Growth on 2017/2018 requirement (%)	WSDP Projection Model
Porterville	711.385 (Y)	> 2042 (1%)	2035 (2%)	2036
Piketberg	945.075 (A)	2024 (3%)	2022 (4%)	2030
Velddrif	1 295.460 (L)	2039 (2%)	2032 (3%)	2025
Dwarskerbos	143.940 (L)	> 2042 (2%)	2038 (3%)	2038
Aurora	56.000 (A)	2028 (1.5%)	2023 (2.5%)	2024
Eendekuil	116.435 (Y)	2027 (2%)	2023 (3%)	2028
Redelinghuys	46.500 (A)	Over (1%)	Over (2%)	Over

Note: The sustainable yield of the Aurora and Redelinghuys water resources needs to be determined, which might affect the figures included in the above table.

The future water requirement projection models include the future projections up to 2042 and were calibrated by using historic billed metered consumption data and bulk metered abstraction data. The percentage NRW was determined for each of the distribution systems and growth in demand was based on agreed population and growth figures. The projected future water requirements are indicated in the table below for each of the distribution systems.

Table C.8.2: Projected future water requirements and allocations / licence / yields surplus (+) / shortfall (-) based on WSDP model

Distribution System	Model	PROJECTED FUTURE WATER REQUIREMENTS (Ml/a)				
		2022	2027	2032	2037	2042
Porterville	1% Annual Growth	520.183	546.717	574.605	603.916	634.722
	2% Annual Growth	546.449	603.324	666.119	735.449	811.995
	WSDP Model	**558.904**	**606.242**	**659.370**	**719.226**	**786.926**
	Yield surplus (+) / shortfall (-)	**+152.481**	**+105.143**	**+52.015**	**-7.841**	**-75.541**
Piketberg	3% Annual Growth	882.513	1 023.074	1 186.023	1 374.926	1 593.916
	4% Annual Growth	926.193	1 126.855	1 370.992	1 668.021	2 029.403
	WSDP Model	**810.004**	**886.841**	**972.633**	**1 068.604**	**1 176.169**
	Allocation surplus (+) / shortfall (-)	**+135.071**	**+58.234**	**-27.558**	**-123.529**	**-231.094**
Velddrif	2% Annual Growth	911.071	1 005.896	1 110.591	1 226.182	1 353.804
	3% Annual Growth	956.616	1 108.980	1 285.612	1 490.377	1 727.755
	WSDP Model	**1 111.373**	**1 356.422**	**1 661.340**	**2 041.590**	**2 516.750**
	Licence surplus (+) / shortfall (-)	**+184.087**	**-60.962**	**-365.880**	**-746.130**	**-1 221.290**
Dwarskersbos	2% Annual Growth	85.208	94.077	103.868	114.679	126.615
	3% Annual Growth	89.468	103.718	120.237	139.388	161.589

Table C.8.2: Projected future water requirements and allocations / licence / yields surplus (+) / shortfall (-) based on WSDP model						
Distribution System	**Model**	**PROJECTED FUTURE WATER REQUIREMENTS (Ml/a)**				
		2022	**2027**	**2032**	**2037**	**2042**
	WSDP Model	**88.702**	**102.251**	**118.118**	**136.729**	**158.590**
	Licence surplus (+) / shortfall (-)	**+55.238**	**+41.689**	**+25.822**	**+7.211**	**-14.650**
Aurora	1.5% Annual Growth	50.708	54.627	58.848	63.396	68.296
	2.5% Annual Growth	53.255	60.254	68.171	77.130	87.265
	WSDP Model	**51.058**	**61.754**	**75.237**	**92.286**	**113.903**
	Allocation surplus (+) / shortfall (-)	**+4.942**	**-5.754**	**-19.237**	**-36.286**	**-57.903**
Eendekuil	2% Annual Growth	104.714	115.613	127.646	140.931	155.599
	3% Annual Growth	109.949	127.461	147.762	171.296	198.579
	WSDP Model	**103.064**	**113.591**	**125.299**	**138.329**	**152.837**
	Yield surplus (+) / shortfall (-)	**+13.371**	**+2.844**	**-8.864**	**-21.894**	**-36.402**
Redelinghuys	1% Annual Growth	51.608	54.240	57.007	59.915	62.971
	2% Annual Growth	54.213	59.856	66.086	72.964	80.558
	WSDP Model	**46.553**	**47.693**	**48.937**	**50.298**	**51.788**
	Allocation surplus (+) / shortfall (-)	**-0.053**	**-1.193**	**-2.437**	**-3.798**	**-5.288**

Note: Velddrif and Dwarskersbos - Bulk potable water is supplied by the West Coast DM from the WCWSS. The system is currently under pressure to meet future water requirements. Next augmentation scheme needs to be implemented.

Piketberg: A Geohydrological investigation was completed for Piketberg during the last financial year. Five boreholes were drilled. The blowout yields ranged between 0.3 l/s and 5 l/s and based on the blow yields only two boreholes were considered for yield testing (PG1 and PG4). The recommendations from the exploration phase of the project for the two boreholes were as follows:

BH PG1:

- The borehole can be pumped at 0.5 l/s for 24 h/day (43m³/day) or 1.5 l/s for 12 h/day (65 m³/day);
- Pump to be installed at 250 mbgl; and
- Water quality is good although Flouride is at 1.5 mg/l and should require treatment.

BH PG2:

- The borehole collapsed after drilling and additional casing needs to be installed; and
- Conduct aquifer test.

The additional recommendations were as follows:

- Investigate area close to the Piketberg Secondary School;
- Investigate the De Hoek fault along the pipeline servitude;
- Investigate the De Hoek fault along the R399;
- Flow meters to measure total water use should be installed;
- Automatic data loggers should be installed to record the water level;
- A low-level cut-off switch should be installed 5 m above the pump intakes; and
- The water use needs (not exceeding 20 m³/d) to be registered with the DWS.

Velddrif and Dwarskersbos: In order to ensure sustainable economic development in the West Coast region the West Coast District Municipality started with a comprehensive study in 2007 to identify a sustainable long-term alternative water source for the region, in order to ensure sustainable economic development. Various alternative sources and combinations thereof were evaluated and eventually a 25.5 Ml/day sea water desalination plant in the Saldanha Bay area was identified as the most beneficial alternative, to be developed in 3 phases as the water requirements grow.

Desalination: The West Coast District Municipality is therefore proposing to construct and operate a sea water desalination plant in the Saldanha Bay area using sea water reverse osmosis (SWRO) technology. The intake capacity of the plant will be approximately 60 Ml/d (21.9 million Ml/a) producing 25.5Ml/d (9.3 million Ml/a) at final capacity. Approximately 36 Ml/d (13 million Ml/a) brine will be discharged into the sea. It will have a lifespan of 25 years with the potential of an extended lifespan.

The plant will be constructed in three phases of 8.5 Ml/d to reach the full capacity by 2026. All infrastructure however will be constructed for the full capacity in the first construction phase. The proposed project consists of the following components:

- Sea water abstraction infrastructure consisting of an intake structure and pipe connected to either an intake sump and pump station at the coast with a pump line to the SWRO plant or connected directly to the sump and pump station situated at the plant.
- The SWRO desalination plant located on land at the sites selected for the study. The size of the site needed is approximately 4-5 Ha and the plant will consist of pre-treatment, RO treatment, electrical and mechanical equipment in a building, reservoir, and other site related infrastructure.
- Treated water reservoir and pump station at the SWRO plant pumping the potable water to the existing Besaansklip reservoirs of the West Coast District Municipality.
- Brine disposal infrastructure from the plant to the sea.
- Access roads to the plant.
- Site works at the plant.
- Electrical substation and connections

The environmental screening and technical evaluation reduced the ten possible sites, which were originally identified, to two proposed sites to be evaluated, i.e. the site at Arcelor Mittal in the Industrial Development Zone (IDZ) of Saldanha Bay and a site in Danger Bay. The Danger Bay site was identified as the most suitable site and the EIA approval was obtained during August 2013 for this site and the concomitant bulk infrastructure.

The proposed desalination plant and bulk infrastructure will cost an estimated R500 million, R300 million more than the original cost estimate. The first phase will include the construction of the desalination plant with a capacity of 8.5 Mℓ per day and the bulk infrastructure, with a capacity of 25.5 Mℓ per day. The desalination plant will be upgraded in three phases of 8.5Mℓ per day up to the final capacity of 25.5 Mℓ per day. Funding of this plant is currently a major challenge, as the West Coast District Municipality is not in a position to co-fund a project of this extent.

The levels of salinity in the Berg River have increased dramatically to the point where the level of assurance of 98% cannot be reached without major engineering effort. Urgent measuring devices must be put in place to monitor the Berg River, to find the reason for the high salinity readings and to mitigate these circumstances. Additional factors will have to be addressed through further investigations to determine the sources of contamination and to include these in the management options at Misverstand.

Increase storage at Withoogte: Although the modelling results from the 'Analysis of Management Options at Misverstand Weir" to mitigate the potential impact on salinity of the Berg Water Project and Voëlvlei Augmentation Scheme (DWS, 2007) indicated that the incremental impact of the Berg Water Project and the Voëlvlei Augmentation Scheme could be mitigated through the provision of an additional 250 000 m³ of off-channel storage capacity, this re-analysis shows that the desired 98% level of assurance would not be achievable. To obtain a 98% level of assurance an additional 0.7 million m³ of storage would be required over and above the readily available 0.5 million m³ at Withoogte.

Increased treatment capacity at Withoogte (Subject to available water from the Berg River)

Water from the Berg River is pumped to the Withoogte WTW from the Misverstand Weir. The current capacity of the WTW is 72 Mℓ/day, which is already critical and needs to be increased to be able to meet the future water requirements. The potable water gravitates to the Besaansklip reservoir at Vredenburg from Withoogte and it was established that the ultimate design capacity of the pipeline is 105 Mℓ/day. The Withoogte WTW therefore needs to be upgraded from the current 72 Mℓ/day to 105 Mℓ/day to be able to accommodate the full design flow of the pipeline. The allocation from the WCWSS therefore has to allow an additional 33 Mℓ/day increase in allocation and an extension to the WTW to treat a total of 105 Mℓ/day. This demand will be reached by 2032 when a sea water desalination plant will have to be in operation to supply the future requirement i.e. 31 Mℓ/day until 3045.

The West Coast District Municipality applied to the DWS in December 2013 to increase the allocation from the System to initially 18.087 million m³/a for the Withoogte supply area, which is to be increased to 30.3 million m³/a by 2033, and to 6.39 million m³/a for the Swartland supply area (to be increased to 11.1 million m³/a by 2033). The current raw water abstraction Licence No. 01/G10F/A/5903 of October 2017 list the following volumes allocated to the respective WSAs, which include operational, treatment and bulk conveyance losses.

Table C.8.3: Volumes allocated to the respective WSAs in Licence No. 01/G10F/A/5903

Name	Resource Name	WSA	Maximum Volume (Ml/a)
Withoogte from Misverstand Weir	Berg River	Saldanha LM	20 427.000
		Swartland LM	1 573.600
		Berg River LM	1 439.400
Swartland from Voëlvlei Dam	Berg River	Swartland LM	7 900.000
		Drakenstein LM	300.000
Langebaan Aquifer Boreholes 1 & 2	Langebaan Aquifer	Saldanha Bay LM	675.000
Langebaan Aquifer Boreholes 3 & 4		Saldanha Bay LM	675.000
Total Allocation for the West Coast District Municipality			**32 990.000**
Total Allocation for the West Coast District Municipality from the WCWSS			**31 640.00**

The DWS also updated their 2010/2011 All Towns Reconciliation Strategies during 2016 and the table below gives an overview of the recommended potential future water resources as included in the updated All Towns Reconciliation Strategies for Bergrivier Municipality.

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)

Distribution System	Option	Potential
Porterville	Re-use of water	• Re-use of water from the WWTW can only be allowed if the existing works is able to provide a 95% assurance of supply in terms of quality requirements. • The final treated effluent from the WWTW is currently discharged into an on-site stream that leads to a farmer's irrigation dam. The re-use of treated effluent is however not regarded as an option as according to the Land Purchase Agreement of 1972, the Knoetzen family has the right to use the final effluent and they intend to carry on using all the final effluent from the WWTW.
	Groundwater	• There are two springs at the foothills of the Porterville Mountains registered in the WARMS database, with a 6 l/s and 7 l/s estimated yield, respectively. Some boreholes drilled into the Malmesbury shale are scattered around the town. Borehole yields can go up to 1.2 l/s, according to the NGA. • Considering the limited available surface water resources, groundwater is likely to be the most suitable alternative option. The TMG sandstones and the Malmesbury shale bear a

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	**Option**	**Potential**
		similar potential for groundwater development whereas the TMG is currently used to a lower degree. This unit in general presents a good aquifer system with typical yields of 10 l/s – 20 l/s and a good water quality.
	Surface Water	• Supply from the Berg River or Voëlvlei Dam: These water resources are already over allocated and to provide the required infrastructure would be costly and the operation and maintenance cost will also be high. • Surface water resources in the vicinity of Porterville and the construction of an additional dam near Porterville: A detailed hydrological study must be undertaken to ensure the optimal utilization of the various streams from the mountains above Porterville. It seems that a substantial quantity of water is available during the winter months, which could be stored and used to augment the water supply of Porterville. • Purchasing of water rights: The purchasing of water rights of the current resources could be an economical option, as the water quality is high and all the necessary infrastructure is already in place.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low.
	Summary	**The current water sources have adequate supply to cater for the medium and longer term future water requirements under all scenarios. The following sources are identified as potential sources to augment the water supply, in order of priority and implementation sequence:** • Continue with the implementation of the existing WC/WDM measures to reduce the non-revenue water and water losses. • Development of alternative groundwater resources, when required.
Piketberg	Re-use of water	• Water re-use may be seen as a suitable intervention for Piketberg, provided that the Bergrivier Municipality can provide a 95% assurance of supply in terms of quality requirements. • A portion of the final effluent is currently re-used for the irrigation of the cricket, rugby and soccer town sport fields and the golf course.
	Groundwater	• Boreholes in the immediate surroundings of the town are few. These boreholes were drilled into the Malmesbury rocks and are registered in the NGDB with yields of up to 2.9 l/s. Further north (about 7 km) borehole density is much higher. Yields of the boreholes drilled into the TMG are generally much higher, exceeding 7 l/s in places. There are about 76 existing boreholes in the TMG rocks of the Piketberg Mountains according to the DWS's National Groundwater Database (NGDB). Statistics from 35 boreholes show an average yield of 2.3 l/s. • The groundwater potential for the whole catchment is generally higher for the intergranular and fractured Malmesbury rocks, but these are also the ones that are currently being used to a much higher degree than the TMG aquifers. In addition, catchment G30H only comprises TMG rocks towards its margin in the area around Piketberg whereas the Malmesbury rocks are spread over the whole catchment area. Therefore, the TMG rocks in the nearby Piketberg Mountains are deemed a potential source for groundwater development in future. • There would appear to be 4 approaches to developing groundwater in this area: ➢ Drilling into or adjacent to the De Hoek Fault. This fault has an effective length of approximately 25 km. ➢ Drilling into the Peninsula Formation where targets are accessible. Many of these targets may already be exploited by existing private boreholes. ➢ Drilling into subsidiary NW-SE trending fault splays in the lower-lying northern slopes of the Piketberg Mountains (i.e. on the farms). ➢ Drilling through the Cenozoic sand cover into the Piekenierskloof Formation to the north-west of the strategy area. • The mean annual volume of recharge to this unit is approximately 8.0 million m^3/a during periods of normal rainfall, which is expected to decline to 5.6 million m^3/a during droughts. The long-term sustainable yield of the unit is estimated at 4.5 million m^3/a, although it may only be possible to safely abstract 3.1 million m^3/a during drier periods. The quantity and quality of the groundwater from the Piketberg unit makes it suitable for development as part of a bulk water supply, which would also supply towns such as Piketberg, Moorreesburg, Koringberg and Aurora. It is, however, important to note that existing groundwater use in this unit may be substantial and that this has not been factored into the estimated available resources of 4.5 million m^3/a.
	Surface Water	The following surface water options may be potential sources for this town: • Piketberg obtains most of its water out of the Berg River from the WCWSS. A License application for an increased allocation from the Berg River (WCWSS) should be submitted to the DWS.

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	**Option**	**Potential**
		• An off-channel storage dam in one of the small non-perennial streams located close to Piketberg is a possibility to utilise the unused winter irrigation water use rights. This water should be bought through a water trading process.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the Mean Annual Precipitation is considered too low.
	Summary	**The current allocated water sources have inadequate supply to cater for the future water requirements under all scenarios. The following sources are identified as potential sources to augment the water supply, in order of priority and implementation sequence:** • Continue with the full-implementation of the existing WC/WDM Strategy. • Increased allocation from the Berg River (WCWSS). • Groundwater development.
Velddrif	Re-use of water	• Water re-use may be seen as a suitable intervention for Velddrif, provided that the Municipality can provide a 95% assurance of supply in terms of quality requirements. The potential re-use option must be considered for Velddrif in the medium to long-term. • The final treated effluent from the WWTW is currently re-used for the irrigation of the rugby field, golf course, cricket field and bowls field.
	Groundwater	• The town of Velddrif is located at the mouth of the Groot Berg River with significant river alluvium in its surroundings. • Just south of the Groot Berg River there is a large patch of the Langebaan Formation comprising locally bedded and cross-bedded consolidated to unconsolidated limestone and lime-rich sand. The Langebaan Formation is considered a major aquifer system with generally good groundwater potential referred to as the Langebaan Road aquifer system. However, in this area the thickness of this aquifer is limited to less than 20 m. • The tertiary intergranular deposits in the area generally bear a great potential for groundwater development in the area but it is not clear whether the limited thickness of these strata allows the abstraction of volumes relevant for municipal water supply. Further hydrogeological information and / or investigation are required to assess the feasibility of groundwater use for drinking water purposes in the area.
	Surface Water	The following surface water options may be potential sources for this town: • Velddrif is located at the mouth of the Berg River. Due to the ecological sensitivity of the area and the poor water quality, direct abstraction from the Berg River is not an option for Velddrif. An increase in the allocation from the Berg River to the West Coast District Municipality is much more likely. • The West Coast District Municipality completed various studies for the augmentation of their existing bulk water sources and also applied to the DWS for an increased allocation from the Berg River. • The Voëlvlei Dam is under stress to meet the projected requirements and thus various options to augment its yield have been considered. It is essential that the portion of the safe yield of the Voëlvlei Dam allocated to Velddrif as part of the West Coast DM's license be determined and included in the Service Level Agreement, in order to make more accurate shortfall projections. This action should be the first priority when considering alternative sources.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low. • A desalination plant with a capacity of 25.5 Ml/d is at present under consideration as part of the long-term planning for the West Coast area. If implemented, such a plant will provide relief to possible water shortages at Velddrif due to the integrated system operated by the West Coast DM.
	Summary	**The current water sources do not have adequate supply to cater for the short, medium and longer term future water requirements under all growth scenarios. The following sources are identified as potential sources to augment the water supply, in order of priority and implementation sequence:** • Continue with the implementation of the existing WC/WDM Strategy to keep the water losses and non-revenue water low and achieve savings in water consumption. • Increased allocation from the WCWSS. • Incremental groundwater development. • Desalination of seawater
Dwarskersbos	Re-use of water	• The re-use of treated effluent is not a feasible option for Dwarskersbos, considering the current treatment process at the WWTW as well as the limited volumes of treated effluent

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	**Option**	**Potential**
		available. • Effluent evaporates from the ponds, but the works has an alternative to irrigate kikuyu grass when there is excess effluent from the last pond. A pump station for irrigation is located below the last pond.
	Groundwater	• The Quaternary sands in the area form a shallow, unconfined, intergranular aquifer. The underlying Malmesbury Group is not considered to form an aquifer. Median borehole yields in the area are low, ranging from 0.1 to 0.5 l/s • Although the potential of the intergranular aquifer is high, the saturated thickness of the aquifer is insufficient for abstracting reasonable quantities of groundwater. Further, the groundwater quality is such that it cannot be used for domestic supply purposes without treatment. It is therefore concluded that the underlying aquifer is not of regional significance, and can only be used at a local scale for garden irrigation and stock watering purposes.
	Surface Water	• There are no major surface water resources near Dwarskersbos. • The West Coast District Municipality completed various studies for the augmentation of their existing bulk water sources and also applied to the DWS for an increased allocation from the Berg River. • The Voëlvlei Dam is under stress to meet the projected future requirements and thus various options to augment its yield have been considered. It is essential that the portion of the safe yield of the Voëlvlei Dam allocated to Dwarskersbos as part of the West Coast DM's license be determined and included in the Service Level Agreement, in order to make more accurate shortfall projections. This action should be the first priority when considering alternative sources.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low. • Desalination of seawater is a feasible option specifically to address the peak holiday requirements. This option should be investigated further, specific for Dwarskersbos. • A desalination plant with a capacity of 25.5 Ml/d is at present under consideration as part of the long-term planning for the West Coast area. If implemented, such a plant will provide relief to possible water shortages at Dwarskersbos due to the integrated system.
	Summary	**The current water sources do not have adequate supply to cater for the short, medium and longer term future water requirements under all growth scenarios. The following sources are identified as potential sources to augment the water supply, in order of priority and implementation sequence:** • Continue with the implementation of the existing WC/WDM Strategy in order to keep the water losses and non-revenue water low and achieve savings in water consumption. • Increasing the allocation to the West Coast District Municipality from the WCWSS. • Incremental groundwater development. • Desalination of seawater.
Aurora	Re-use of water	• Re-use of treated effluent is currently not a feasible option in Aurora as there is no water-borne sanitation system in place.
	Groundwater	• There are numerous boreholes, mostly in the area north-northwest of Aurora, registered in the NGA. Usually borehole yields range below 2 l/s. One borehole drilled into the Peninsula sandstone, however, is registered with a yield of 5 l/s. • The town itself is underlain by an extensive quaternary sand layer, which is part of the Adamboerskraal Aquifer System. The safe yield and licensed abstraction of the municipal boreholes and spring are unknown. It is essential that these be determined in order to perform a more accurate prediction of the future water scenario in Aurora. • The potential for groundwater use is very high for the intergranular aquifers. The number for the TMG aquifers is very small because they only constitute a small proportion of the catchment surface. However, since Aurora is located at the transition between intergranular deposits and the TMG outcrops, both might be a reasonable option for groundwater development. • There are two target options: ➢ The quaternary sand: an aquifer system with possible yields of 2 – 5 l/s, but sensitive to abstraction and periods of low rainfall and susceptible to contamination. The advantages of use of this system are ease of access and development. ➢ Fractured sandstone of the Peninsula Formation. This unit generally presents a good aquifer system with typical yields of 10 l/s – 20 l/s and a good water quality. • The report Development Potential of the Groundwater Resources of the WCDM [4] states the groundwater quality in the Cenozoic deposits to the north of the Papkuils River (Aurora)

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	**Option**	**Potential**
		as generally good (50 – 170 mS/m) due to significant lateral inflows of fresh groundwater from the TMG aquifer system between Aurora and Piketberg.
	Surface Water	• There are limited local surface water resources available in the area but it can be linked to the Saldanha Regional Scheme at Velddrif.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low.
	Summary	**It is not known whether the current water sources have adequate supply to cater for the medium and longer-term future water requirements, as their yields are unknown. It is recommended that the yields of all available sources be determined before any other interventions are considered. The following sources are identified as potential sources to augment the water supply, if the existing yield is not adequate, in order of priority and implementation sequence:** • Continue with the implementation of the existing WC/WDM Strategy in order to reduce the existing water losses and non-revenue water even further. • Incremental groundwater development. • Link up with the Saldanha Regional Scheme at Velddrif.
Eendekuil	Re-use of water	• Eendekuil is not entitled to use the minimal effluent from the Eendekuil WWTW. If any, it is used by the neighbouring farmer as part of the land agreement for the WWTW. • The re-use of treated effluent is further not a feasible option for Eendekuil, considering the current treatment process at the WWTW as well as the limited volumes of treated effluent available.
	Groundwater	• On the 1:500 000 hydrogeological map the intergranular and fractured aquifer is reported to show a low average borehole yield of 0.1 to 0.5 l/s. Water quality is low, too, with an electrical conductivity of 300 to 1 000 mS/m. Groundwater recharge is 25 to 37 mm/a (medium). • There are a few boreholes registered in the NGA in the area around Eendekuil. The registered yields are in the order of 1.2 l/s. • There is a high groundwater potential for the intergranular and fractured Malmesbury rocks. The limiting factor for development of this source is the low borehole yields most likely caused by low hydraulic conductivity of the shale. The groundwater potential of the quaternary deposits is assessed significantly lower. This aquifer system shows available yields of 2 – 5 l/s, but is sensitive to abstraction and periods of low rainfall and susceptible to contamination. The advantages of use of this system are ease of access and development. The TMG only exhibits a potential of 1.38 million m^3/a. However, this unit in general presents a good aquifer system with typical yields of 10 l/s – 20 l/s and a good water quality. • Borehole density and yields increase significantly towards the west. There is intensive groundwater use along the foothills of the outcrops of the TMG about 8km west. The adjacent tertiary deposits also seem to be more practicable for groundwater development. To assess the options of groundwater usage for municipal supply in the Eendekuil area in detail, further hydrogeological investigation is required.
	Surface Water	Eendekuil is currently supplied with water from the Waboom River and the Waboomfontein Spring. Apart from the Waboom dams, it seems that all other existing dams are privately owned and that no water in these dams is available to Eendekuil. The current water supply will meet the future water requirements until 2030. Should the high-growth scenario be realised, the following surface water options may be potential sources for this town: • The Kruismans Stream runs alongside Eendekuil. The Stream appears to be non-perennial and, therefore, the potential for abstraction is probably quite limited. An option to consider is to use water from the above-mentioned stream to recharge the aquifers in the surrounding area. This will require a hydrological analysis of the stream, and recharge potential of the aquifer. • The two options to provide additional water storage at the Waboom dams are to construct an additional dam adjacent to the existing two dams or to increase the wall height of the existing dams. There might be surplus water in years with above average rainfall and the additional storage could be created for this water and for storing water from the fountains. • The Diepkloof catchment area is 2.9 km², which is slightly larger than the Waboom dams' catchment area. The estimated MAR for this catchment is approximately 115 000 m³/a. It will however be difficult to intercept peak flows if a dam is not constructed within the river. The Diepkloof catchment could supply, in terms of the future Eendekuil requirement, a significant portion of the required water, but the following must be noted: ➢ The possible construction of a dam will be in an area defined as a water stressed area;

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	**Option**	**Potential**
		➢ The dam will be constructed on private land; ➢ A license must be obtained to abstract water, alter the water course and store water, and ➢ A comprehensive Environmental Impact Assessment must be undertaken. An advantage of this option is however that a dam will be constructed in close proximity to the proposed pressure break tank of the existing bulk system. Only limited additional infrastructure would therefore be required to connect to the existing bulk supply system.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low.
	Summary	**The current water sources have adequate supply to cater for the medium and longer-term future water requirements under a high-growth scenario until 2030.** Pending the outcome of a detailed groundwater study and the future development of Eendekuil, it is not recommended at this stage to develop surface water resources by constructing an additional dam. Should the boreholes not yield any water and growth takes place in Eendekuil, the construction of a new dam in the Diepkloof catchment area or the construction of an additional dam to store water from the Waboom River should be investigated in detail. **The following sources are identified as potential sources to augment the current water supply, in order of priority and implementation sequence:** • Continue with the full implementation of the existing WC/WDM Strategy. • Incremental groundwater development. • Recharge of aquifers from the Kruismans Stream, when required.
Redelinghuys	Re-use of water	• Water re-use is not a suitable option as there is no water-borne sanitation system in the town.
	Groundwater	• There are a few boreholes in the immediate surroundings of the town with unregistered geology and yield. Another borehole about 2.5 km north-east was drilled into the Peninsula Formation and has a registered yield of 2.4 l/s. • There are several NGA entries in the area of Matroozefontein about 3.5 km south-east with registered yields of up to 20 l/s. • The available target options are: ➢ The quaternary sand: an aquifer system with possible yields of 2 – 5 l/s, but sensitive to abstraction and periods of low rainfall and susceptible to contamination. Water quality is reported to be good (0-70 mS/m) and groundwater recharge is low (37-50 mm/a). The advantages of use of this system are ease of access and development. ➢ Fractured sandstone of the Peninsula or Piekenierskloof Formation in the northern or western outcrop. This unit in general presents a good aquifer system with typical yields of 10 l/s – 20 l/s and a good water quality. • There is no detailed information on the nature of the springs used for water supply.
	Surface Water	• Redelinghuys is located on the Verlorevlei Wetland. It is unlikely that surface water abstraction will be possible due to the sensitive ecology of the wetland.
	Other Sources	• Rainwater harvesting is not a suitable option for the area because the mean annual precipitation is considered too low.
	Summary	**The current water sources have inadequate supply to cater for the medium and longer term future water requirements. The following sources are identified as potential sources to augment the current water supply, in order of priority and implementation sequence:** • Continue with the full implementation of WC/WDM measures to reduce water losses and non-revenue water. • Incremental groundwater development.

C.9. Institutional Arrangement Profile

Bergrivier Municipality is the WSA for the entire Municipal Management Area. A Service Level Agreement is in place with the West Coast District Municipality for the provision of bulk potable water to Velddrif and Dwarskersbos.

Bergrivier Municipality's WSDP was updated according to the new eWSDP format and submitted to the Council for approval on the 25th of October 2016. A WSDP Performance- and Water Services Audit Report is compiled annually and taken to Council with the Annual Report. Water Services By-laws are also in place and was promulgated.

The education of users in low cost income areas where sanitation facilities are upgraded to waterborne systems is on-going. This is primarily focussed at informing users of the appropriate use of and routine maintenance of such facilities.

Municipal Strategic Self-Assessment (MuSSA): Overseen by the DWS the MuSSA conveys an overall business health of municipal water business and serves as a key source of information around municipal performance. The MuSSA also identifies key municipal vulnerabilities that are strategically important to DWS, the Department of Cooperative Government (DCoG), National Treasury, the planning Commission/Office of the Presidency, the South African Local Government Association (SALGA) and the municipalities themselves. The MuSSA team continues to engage (1) DWS directorates and their associated programmes (e.g. Water Services Development Plan, Water Services Regulation), and (2) other sector departments and their associated programmes (e.g. LGTAS, MISA) to minimize duplication and ensure alignment. Through the tracking of current and likely future performance, the key areas of vulnerability identified, allow municipalities to effectively plan and direct appropriate resources that will also enable DWS and the sector to provide support that is more effective.

The Spider Diagram below effectively indicates the vulnerability levels of Bergrivier Municipality across the sixteen key service areas, as identified through the Municipal Strategic Self-Assessment of Water Services process.

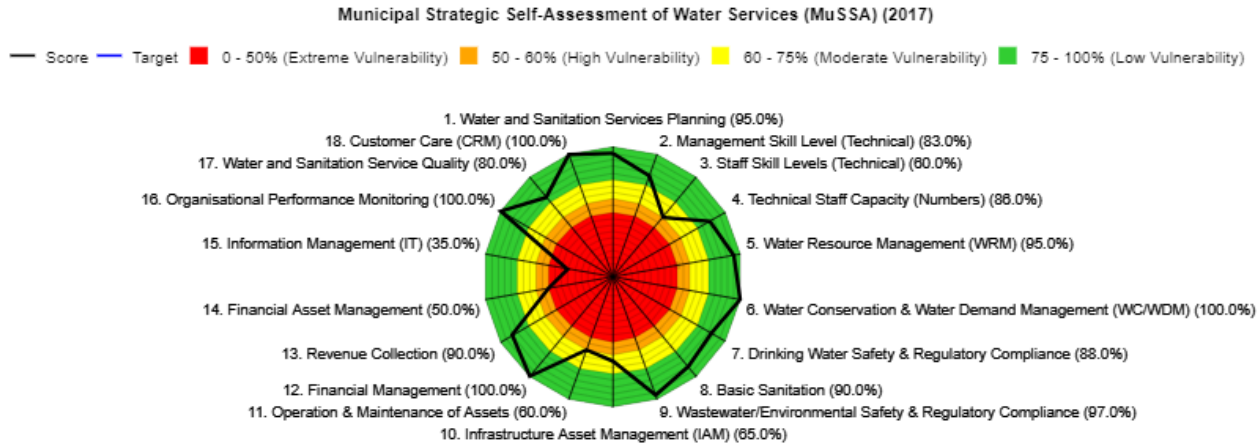


Figure C.9.1: Spider Diagram of the vulnerability levels of Bergrivier Municipality for 2017

The one area of concern evident from the 2016 assessment is Information Management (IT), which only obtained a score of 35%. The overall vulnerability index of Bergrivier Municipality is 0.19 for the 2017 assessment.

Table C.9.1: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Bergrivier Municipality

Section	Vulnerability
Water and Sanitation Service Quality • Critical business databases and documents (e.g. as-built drawings, records, manuals, agreements, billing/revenue collection, project and scheme management data, etc.) are current, maintained and stored in secure locations (on-site and off-site, both paper and electronic). • Customers have a functional, reliable and safe water supply system with sufficient quantity and flow, good quality and minimal interruptions. • All consumers served experience interruptions of less than 48 hours (at any given time) and a cumulative interruption time during the year of less than 15 days. • Households in your WSA experience water pressure problems (no flow/partial flow less than 10 litres / minute) (not to be confused with interruption to supply). • Customers have a functional, reliable, dignified and safe sanitation system with no blockages resulting in overflows that impact on the environment, including effective collection and treatment of faecal sludge.	**Low (80.0%)**

Table C.9.1: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Bergrivier Municipality	
Section	**Vulnerability**
Customer Care • A functional customer service system manned by appropriate customer services representatives and using a complaints register, is in place to address complaints and appropriately inform customers of service interruptions, contamination of water, boil water alert, etc. • Regular municipal wide customer satisfaction surveys are conducted to determine customer satisfaction levels and inform the Customer Care Management Plan. • Please indicate what percentage of the reported water related complaints/callouts are acknowledged, including consumer response, within 24 hours. • Please indicate what percentage of the reported wastewater/sanitation related complaints/callouts are acknowledged, including consumer response, within 24 hours. • A comprehensive customer awareness programme (informing customers of water and wastewater system O&M activities, water quality, resource protection / pollution, reporting incidents / security concerns, etc.) is in place and implemented.	**Low (100.0%)**
Water and Sanitation Services Planning • Your appropriate water and sanitation services planning (e.g. WSDP) and associated master planning processes include and are aligned with appropriate Water and Sewage Master Plans, Spatial Development Framework, Water Safety Plans and Wastewater Risk Abatement Plans (W_2RAPs), and are aligned to your IDP and associated SDBIP targets. • You are implementing an up-to-date and adopted municipal water and sanitation services plan (e.g. WSDP). • Your current project list addresses existing needs / shortcomings identified through the WSDP and associated master planning process. • Project progress is monitored, tracked and reported to municipal top management / council and the Regulator (through the annual water and sanitation services report). • Projects identified through your various planning processes have been implemented in the last 3 years.	**Low (95.0%)**
Water Resource Management (WRM) • The recommendations and actions from the Reconciliation Strategies (Large Systems / All Towns) have been incorporated into your WSDP, master planning and IDP processes. • The metered quantity of water available from the resources is sufficient for your future WSA needs (at the stipulated level of abstraction and assurance of supply, and considering possible climate change impacts) (i.e. no shortage in 10 years). • The quantity of water available from the resources is sufficient for your future WSA needs (at the stipulated level of assurance of supply) (i.e. no shortage in 10 years). • The source water quality is currently acceptable for its purpose. • The trend indicates a deteriorating source water quality.	**Low (95.0%)**
WC/WDM • Your WSA has developed a council approved WC/WDM Strategy, which includes a standard water balance (e.g. modified IWA). • Please indicate your percentage Non-Revenue Water (NRW) as per the modified IWA water balance. • System input volumes (bulk) to the WSA are accurately monitored using calibrated bulk meters (e.g. check metering). • Please indicate what percentage of all connections are metered and billed (residential and non-residential (commercial, industrial, etc.)) on a monthly basis. • Your WSA is implementing appropriate intervention programmes to reduce NRW (e.g. minimisation of night flows through pressure management, removal of unlawful connections, leak detection and repairs, consumer education / awareness).	**Low (100.0%)**
Drinking Water Safety and Regulatory Compliance • Please indicate your microbiological drinking- water quality compliance for E.Coli (or faecal coliforms) for the communities you are monitoring for the last 12 months. • ALL your supply schemes, WTWs, process controllers, monitoring programmes, sample points, laboratories, results, procedures, protocols, etc. are managed with a suitable Water Safety Planning framework. • Council have been made aware of high risk / critical water safety plan related issues (including those identified via the Blue Drop Certification programme) that require budget and auctioning, and these issues have been actioned (where applicable).	**Low (88.0%)**

Table C.9.1: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Bergrivier Municipality	
Section	**Vulnerability**
• Sufficient funds have been made available to address all these identified water safety related issues. • Required corrective actions/remedial measures to address all these identified water safety related issues have been successfully implemented.	
Basic Sanitation • You have formal housing areas that are not fully serviced with sanitation infrastructure. • You have informal housing or rural areas that are not fully serviced with sanitation infrastructure. • You have a detailed plan and programme to provide safe sanitation to all households (including health and hygiene education and user awareness including Water, Sanitation and Health (WASH) aspects). • Your sanitation budget is appropriate for required sanitation programmes (implementation and O&M). • You are servicing your basic sanitation facilities (e.g. pit latrines) as per safe sanitation requirements (healthy, environmentally safe, structurally sound, regularly maintained, following faecal sludge management best practices).	**Low (90.0%)**
Wastewater / Environmental Safety and Regulatory Compliance • Please indicate your treated wastewater effluent compliance for COD for your (or your service provider's) WWTWs for the last 12 months. • ALL WWTWs, process controllers, monitoring programmes, sample points, laboratories, results, procedures, protocols, etc. are managed with a suitable wastewater risk abatement framework. • Council have been made aware of all W_2RAP related issues (e.g. pollution incidents, Green Drop deficiencies) that require budget and auctioning, and these issues have been actioned (where applicable). • Sufficient funds have been made available to address all identified wastewater and environmental safety related issues. • Required corrective actions/remedial measures to address all identified wastewater and environmental safety related issues have been successfully implemented.	**Low (97.0%)**
Infrastructure Asset Management • You have an appropriate and up-to-date water and sanitation services technical Asset Register (includes asset name, location, condition, extent, remaining useful life, performance and risk). NOTE: This does only not refer to GRAP17 asset register requirements. • You have developed an appropriate Infrastructure Asset Management (IAM) Plan for your WSA. • You are implementing the IAM outcomes. • Budget allocated to implement IAM outcomes is sufficient and is being effectively spent. • You conduct annual technical assessments of your water and wastewater related systems (including sources, WTWs, WWTWs, pump stations, network, etc.) and implement required follow-up actions.	**Moderate (65.0%)**
Operation and Maintenance of Assets • Appropriate maintenance facility(ies) that is (are) secure and stocked with essential equipment (e.g. spare parts), plant and tools is (are) available. • Appropriate water and sanitation services infrastructure / equipment planned / preventative maintenance schedules are developed. • Appropriate planned / preventative maintenance is performed at all WTWs and associated reservoirs, pump stations and distribution networks. • Appropriate planned / preventative maintenance is performed at all WWTWs, associated collection systems and pump stations. • Please indicate your infrastructure repairs and maintenance costs as a function of total operating expenditure (%).	**High (60.0%)**
Information Management • You have a developed, approved and implemented IT Master Systems Plan (e.g. covering 3-5 years) that addresses your IT business requirements. • You have a developed, approved and implemented ICT Technology Master Plan that addresses your current and future IT infrastructure requirements. • You have IT systems that support your full range of water and sanitation services business requirements (e.g. billing, GIS, customer care, O&M, asset management). • ICT service continuity – Adequate IT security exists with off-site back-ups / archiving of operation critical applications, databases, data, etc. routinely performed in terms of an IT disaster Recovery Plan.	**Extreme (35.0%)**

Table C.9.1: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Bergrivier Municipality	
Section	**Vulnerability**
• You have sufficient budget and staff to keep key IT systems table and up-to-date as per IT policies and procedures.	
Organisational Performance Monitoring • Appropriate plans, policies and procedures to address Disaster Management / emergencies and other issues (safety, public participation, communication, etc.) are developed and implemented. NOTE: Although Disaster Management is a district function, LMs need to ensure they are aware of their associated roles and responsibilities and have developed a Disaster Management Framework. • An organisational performance management system is developed and implemented (i.e. effectively measure, monitor and track water and sanitation services performance indicators). • A municipal risk management framework is developed and implemented and includes monitoring and tracking of water and sanitation related risks. • Effective administration support is available to technical staff to assist with processing work orders, providing order numbers, handling correspondence, etc. • "Access to Basic Water and Sanitation Services" progress reports are frequently produced and presented to council for discussion, action and follow-up.	**Low (100.0%)**
Financial Management • Financial controls - Please state the audit opinion with regard to your last audit report on the financial statements. • Cash flow status – Please state your Cash / Cost Coverage Ratio (excluding Unspent Conditional Grants) • Your actual operating expenditure closely reflects your budgeted operating expenditure (i.e. Operating Expenditure Budget Implementation Indicator). • Your actual revenue closely reflects your budgeted operating revenue (i.e. Operating Revenue Budget Implementation Indicator). • Liabilities (Creditors) - Money is owed by your municipality to major / critical service providers (e.g. ESKOM, Water Board, largest contractors, etc.) for more than 30 days from receipt of invoice (NOTE: Ignore disputed invoices).	**Low (100.0%)**
Revenue Collection • Please indicate the frequency of actual consumer meter readings. • Net Surplus / Deficit – Please state your net surplus / deficit from water services activities for the last 12 months (NOTE: This question tests whether your WSA currently has fully cost reflective Water and Sanitation Tariffs, which take into account cost of maintenance and renewal of purification plants and networks and the cost of new infrastructure). • Revenue collections - Please state the revenue collection rate in respect to Water and Sanitation Services (%). • Revenue Growth – Please state your Water and Sanitation Services revenue growth for the last 12 months (%). • Grant dependency – Actual-operating revenue less operational grants / subsidies (e.g. equitable share) sufficiently covers actual operating expenditure.	**Low (90.0%)**
Financial Asset Management • Capital Expenditure (Municipal). Please state your municipal Capital Expenditure as a percentage of Total Expenditure (i.e. Total Operating Expenditure + Capital Expenditure). • Capital Expenditure (Water Services). Please state your Capital Expenditure on Water and Sanitation Services as a percentage of Total Capital Expenditure (Capital Expenditure (Municipal)). • Asset Renewal. Please state your Asset Renewal investment as percentage of Depreciation Costs. • Repairs and Maintenance. Please state your Repairs and Maintenance expenditure as a percentage of Property, Plant and Equipment, Investment Property (Carrying Value). • Grant funding of capital expenditure – Please state your reliance on grant funding.	**Extreme (50.0%)**
Management Skill Level (Technical) • Your council approved technical management organisational organogram meets your business requirements, and key posts are filled (e.g. Technical Director, Water Services Manager, and Sanitation Services Manager). • You have sufficient technical management and technical support staff. • Technical management and technical support staff have the correct skills / qualifications and experience as per Job Description requirements (e.g. if Job Description requires Pr Eng, Pr Tech or CPM, the staff have these qualifications).	**Low (83.0%)**

Table C.9.1: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Bergrivier Municipality	
Section	**Vulnerability**
• Managers and technical support staff regularly attend appropriate water and sanitation services skills development / training to support professionalisation. • Key technical managers (e.g. Section 56 and other Senior Management) have signed and monitored Performance Agreements.	
Staff Skill Levels (Technical) • WTWs are operated by staff with the correct skills / qualifications and experience (as per Regulation 2834). • WWTWs are operated by staff with the correct skills / qualifications and experience (as per Regulation 2834). • Water system plumbers, mechanics and electricians have the correct skills / qualifications and experience. • Sewage system plumbers, millwrights, mechanics and electricians have the correct skills/qualifications and experience (including contractors / outsourced resources). • Staff regularly attend appropriate water services skills development / training (including safety) (e.g. ESETA courses).	**High (60.0%)**
Technical Staff Capacity (Numbers) • Your council approved technical staff organisational organogram meets your business requirements, and posts are filled (i.e. Superintendent of WTWs / WWTWs and below). • WTWs are operated by the appropriate number of staff (as per Regulation 2834). • WWTWs are operated by the appropriate number of staff (as per Regulation 2834). • You have sufficient water and sewerage/sanitation network operations and repair staff/plumbers including contractors / outsourced resources (i.e. you have the appropriate number of staff). • An active mentoring/shadowing programme is in place where experienced staff train younger, inexperienced municipal staff.	**Low (86.0%)**

The Municipal staff is continuously exposed to training opportunities, skills development and capacity building at a technical, operations and management level in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled annually and the specific training needs of the personnel, with regard to water and wastewater management are determined annually. The table below gives an overview of the training provided for personnel in the Water and Waste Water Departments, during the 2017/2018 financial year, as taken from the Workplace Skills Plan.

Table C.9.2: Training provided during the 2017/2018 financial year (Workplace Skills Plan)			
Training Programme	**Type of Intervention**	**No Trained**	**Funding Source**
Training completed up to April 2018			
SAMTREC	Skills Programme	1	Municipal funds
IDP Learnership	Learnership	1	LGSETA funds
Local Government Advance Accounting Certificate	Learnership	5	LGSETA funds
Local Government Account Certificate	Learnership	4	LGSETA funds
Bricklayer	Apprenticeship	2	Municipal funds
Plumbing	Apprenticeship	2	Municipal funds
Incident Investigation (Health and Safety)	Skills Programme	36	Municipal funds
Cherry Picker	Skills Programme	6	Municipal funds
Digger Loader	Skills Programme	10	Municipal funds
Pay Day	Short Course	6	Municipal funds
RPL Short Course in Administration	Short Course	1	Municipal funds
Welding Apprenticeship	Apprenticeship	3	Municipal funds
Code 10 and 14 Learners and Drivers licences	Short Course	13	Municipal funds
Client Services	Skills Programme	9	LGSETA funds
Handy Man	Skills Programme	6	Municipal funds
Conflict Management	Skills Programme	26	Municipal funds
Accounting (Grap / Budget)	Short Course	5	Provincial funds
Internal Audit Learnership	Learnership	1	Municipal funds
Tiling	Short Course	2	Municipal funds

Table C.9.2: Training provided during the 2017/2018 financial year (Workplace Skills Plan)			
Training planned up to June 2018			
Microsoft Office: Word / Excel	Skills Programme	42	Municipal funds
Small Machinery (Brush cutter / Roller, etc.)	Short Course	11	Municipal funds
MFMP	Skills Programme	5	Municipal funds
Minute Taking	Skills Programme	3	Municipal funds
Supervisory Skills	Skills Programme	12	Municipal funds
Grade L	Short Course	1	Municipal funds
Water Process Controller	Learnership	2	Municipal funds
Road Construction NQF2	Learnership	5	Municipal funds
Electrician Subjects	Skills Programme	7	Municipal funds
Stock Control	In house	12	In house

The WTWs and WWTWs in Bergrivier Municipality's Management Area and the Process Controllers working at these plants are registered with the DWS.

The Occupational Health and Safety Act contain provisions directing employers to maintain a safe workplace and to minimize the exposure of employees and the public to workplace hazards. It is therefore important for Bergrivier Municipality to compile a Legal Compliance Audit of all their WTWs and WWTWs, which will provide the management of Bergrivier Municipality with the necessary information to establish whether the Municipality is in compliance with the legislation or not.

Bergrivier Municipality's Organogram, which include water and sanitation services, is included in Annexure G. Bergrivier Municipality is currently effectively managing its water and sanitation services. Special focus is however required to ensure adequate rehabilitation and maintenance of the existing water and sewerage infrastructure. The Water and Sewer Master Plans guide all forward planning for water and sanitation services.

C.10. Social and Customer Services Requirements

A comprehensive Customer Services and Complaints system is in place at Bergrivier Municipality and the Municipality has maintained a high and a very consistent level of service to its urban water consumers. After hour emergency requests are being dealt with by the control room on a twenty-four hour basis. All water and sanitation related complaints are logged through the system in order to ensure quick response to complaints.

Table C.10.1: Water indicators monitored by Bergrivier Municipality with regard to customer services and maintenance work									
Service	**Indicator**	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**	**Total**
Repair pipe bursts	Repair of burst water pipelines	-	-	-	-	-	-	-	**-**
Other	Other water complaints (Not specified)	-	-	-	-	-	-	-	**-**
Pipelines water	Inspect / repair of faulty water pipelines	-	-	-	-	-	-	-	**-**
Stop-cock	Inspect / Repair leaking stop-cocks	1	1	-	-	-	-	3	**5**
Water Pressure	Inspect / Test water pressure	-	-	-	-	-	-	-	**-**
Water Quality	Inspect / Test water quality	-	-	-	-	-	-	-	**-**
Water Supply	Faulty water supply	-	-	-	-	-	-	2	**2**
Water meters	Inspect / Test / Repair / Install	8	-	2	-	-	-	-	**10**
Total for 2017/2018		**9**	**1**	**2**	**-**	**-**	**-**	**5**	**17**
Repair pipe bursts	Repair of burst water pipelines	-	1	-	-	-	-	-	**1**
Other	Other water complaints (Not specified)	2	-	-	-	-	-	-	**2**
Pipelines water	Inspect / repair of faulty water pipelines	6	-	-	-	-	-	-	**6**
Stop-cock	Inspect / Repair leaking stop-cocks	1	-	-	-	-	-	-	**1**

Table C.10.1: Water indicators monitored by Bergrivier Municipality with regard to customer services and maintenance work									
Service	**Indicator**	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**	**Total**
Water Pressure	Inspect / Test water pressure	-	-	-	1	-	-	-	**1**
Water Quality	Inspect / Test water quality	-	2	-	-	-	-	1	**3**
Water Supply	Faulty water supply	-	-	-	-	-	-	-	**0**
Water meters	Inspect / Test / Repair / Install	2	1	-	-	-	-	-	**3**
Total for 2016/2017		**11**	**4**	**0**	**1**	**0**	**0**	**1**	**17**
Repair pipe bursts	Repair of burst water pipelines	4	-	-	-	-	-	-	**4**
Other	Other water complaints (Not specified)	-	1	-	-	-	-	-	**1**
Pipelines water	Inspect / repair of faulty water pipelines	10	3	-	-	-	-	-	**13**
Stop-cock	Inspect / Repair leaking stop-cocks	6	-	-	-	1	-	1	**8**
Water Pressure	Inspect / Test water pressure	-	-	-	-	-	-	-	**0**
Water Quality	Inspect / Test water quality	-	-	-	-	-	-	-	**0**
Water Supply	Faulty water supply	1	-	-	-	-	-	-	**1**
Water meters	Inspect / Test / Repair / Install	13	-	11	1	-	-	-	**25**
Total for 2015/2016		**34**	**4**	**11**	**1**	**1**	**0**	**1**	**52**
Repair pipe bursts	Repair of burst water pipelines	-	-	-	-	-	-	-	**0**
Other	Other water complaints (Not specified)	1	-	-	-	-	-	-	**1**
Pipelines water	Inspect / repair of faulty water pipelines	21	7	1	-	-	-	-	**29**
Stop-cock	Inspect / Repair leaking stop-cocks	12	6	6	-	-	-	-	**24**
Water Pressure	Inspect / Test water pressure	1	-	-	-	-	-	-	**1**
Water Quality	Inspect / Test water quality	-	1	-	-	-	-	-	**1**
Water Supply	Faulty water supply	4	1	1	-	-	-	-	**6**
Water meters	Inspect / Test / Repair / Install	12	3	9	-	-	-	-	**24**
Total for 2014/2015		**51**	**18**	**17**	**0**	**0**	**0**	**0**	**86**
Repair pipe bursts	Repair of burst water pipelines	-	1	-	-	-	-	-	**1**
Other	Other water complaints (Not specified)	-	1	-	-	-	-	-	**1**
Pipelines water	Inspect / repair of faulty water pipelines	3	-	-	-	-	-	-	**3**
Stop-cock	Inspect / Repair leaking stop-cocks	1	2	-	-	-	-	-	**3**
Water Pressure	Inspect / Test water pressure	-	-	-	-	-	-	-	**0**
Water Quality	Inspect / Test water quality	-	-	-	-	-	-	-	**0**
Water Supply	Faulty water supply	-	-	-	-	-	-	-	**0**
Water meters	Inspect / Test / Repair / Install	2	-	1	-	-	-	-	**3**
Total for 2013/2014		**6**	**4**	**1**	**0**	**0**	**0**	**0**	**11**

C.10.2: Sanitation indicators monitored by Bergrivier Municipality with regard to customer services and maintenance work									
Service	**Indicator**	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**	**Total**
Sewer blockages	Repair blockages on main sewer pipelines up to connection points	14	4	-	-	-	-	-	**18**
Sewer manholes	Inspect / Repair manholes	-	-	-	-	-	-	-	**-**
Other	Other sewer complaints (Not specified)	1	-	-	-	-	-	-	**1**
Sewer spillage	Investigate and clean sewer spillages	-	-	-	-	-	-	-	**-**
Sewer Connections	Installation of sewer connections	1	-	-	-	-	-	-	**1**
Total 2017/2018		**16**	**4**	**-**	**-**	**-**	**-**	**-**	**20**
Sewer blockages	Repair blockages on main sewer pipelines up to connection points	14	5	3	1	-	-	1	**24**

C.10.2: Sanitation indicators monitored by Bergrivier Municipality with regard to customer services and maintenance work									
Service	**Indicator**	**Porterville**	**Piketberg**	**Velddrif**	**Dwarskersbos**	**Aurora**	**Eendekuil**	**Redelinghuys**	**Total**
Sewer manholes	Inspect / Repair manholes	-	-	-	-	-	-	-	**-**
Other	Other sewer complaints (Not specified)	-	1	-	-	-	-	4	**5**
Sewer spillage	Investigate and clean sewer spillages	-	-	-	-	-	-	-	**-**
Sewer Connections	Installation of sewer connections	-	-	-	-	-	-	-	**-**
Total 2016/2017		**14**	**6**	**3**	**1**	**0**	**0**	**5**	**29**
Sewer blockages	Repair blockages on main sewer pipelines up to connection points	58	3	3	-	-	-	1	**65**
Sewer manholes	Inspect / Repair manholes	-	-	-	-	-	-	-	**0**
Other	Other sewer complaints (Not specified)	-	1	-	-	-	-	-	**1**
Sewer spillage	Investigate and clean sewer spillages	-	-	-	-	-	-	-	**0**
Sewer Connections	Installation of sewer connections	-	1	-	-	-	-	-	**1**
Total 2015/2016		**58**	**5**	**0**	**0**	**0**	**0**	**0**	**67**
Sewer blockages	Repair blockages on main sewer pipelines up to connection points	115	19	7	-	-	-	-	**141**
Sewer manholes	Inspect / Repair manholes	-	-	-	-	-	-	-	**0**
Other	Other sewer complaints (Not specified)	1	1	-	-	-	-	-	**2**
Sewer spillage	Investigate and clean sewer spillages	-	-	-	-	-	1	-	**1**
Sewer Connections	Installation of sewer connections	-	2	-	-	-	-	-	**2**
Total 2014/2015		**116**	**22**	**7**	**0**	**0**	**1**	**0**	**146**
Sewer blockages	Repair blockages on main sewer pipelines up to connection points	15	-	-	-	-	-	-	**15**
Sewer manholes	Inspect / Repair manholes	1	-	-	-	-	-	-	**1**
Other	Other sewer complaints (Not specified)	-	-	-	-	-	-	-	**0**
Sewer spillage	Investigate and clean sewer spillages	-	-	-	-	-	-	-	**0**
Sewer Connections	Installation of sewer connections	-	-	-	-	1	-	-	**1**
Total 2013/2014		**16**	**0**	**0**	**0**	**1**	**0**	**0**	**17**

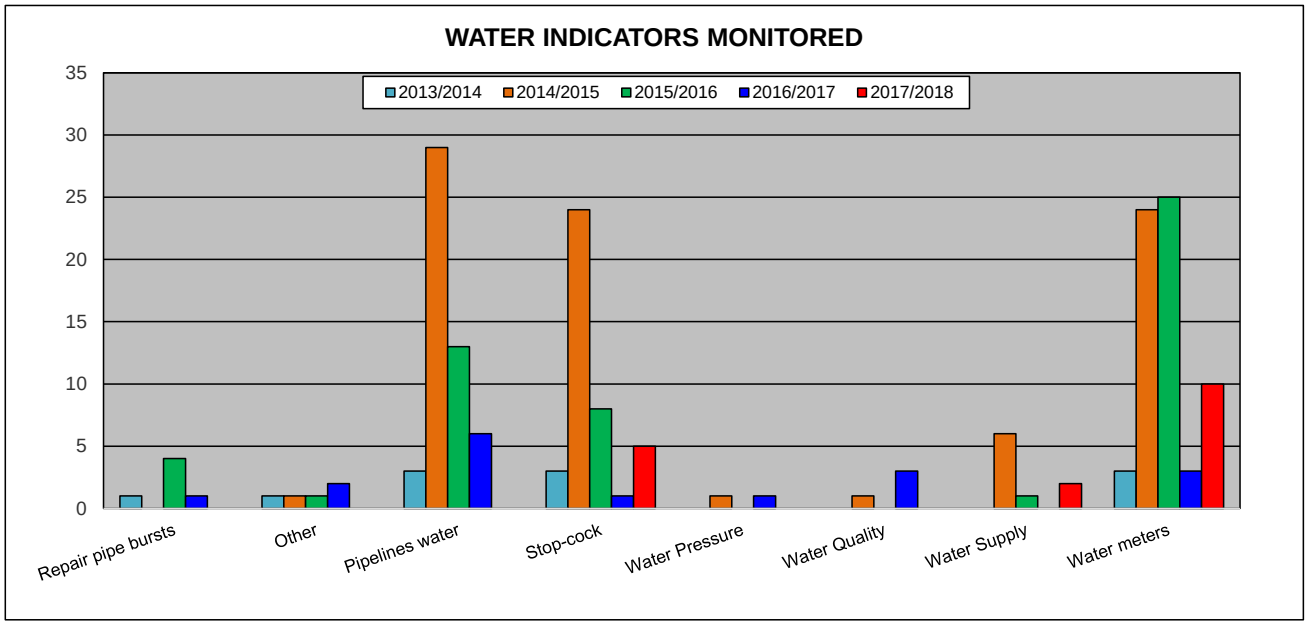


Figure C.10.1: Water Indicators Monitored by Bergrivier Municipality

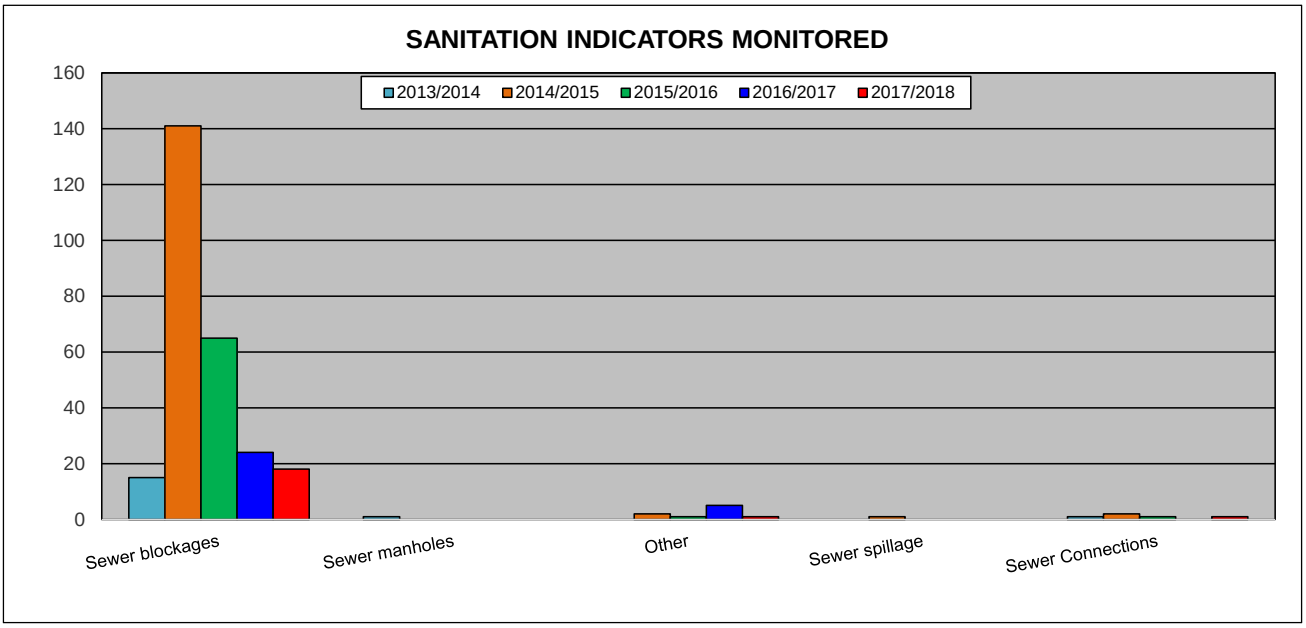


Figure C.10.2: Sanitation Indicators Monitored by Bergrivier Municipality

Bergrivier Municipality further developed a Client Services Charter in collaboration with various stakeholders to affirm their commitment to providing unsurpassed service delivery within the Bergrivier Municipality's Management Area. The standards for water and sewerage services, as stipulated in the Client Services Charter, are summarised in the table below:

Table C.10.3: Water and Sewerage standards as included in the Client Services Charter	
Water	
Connection	Done within five (5) working days after receipt of the completed application form.
Replacement of meters	Done within three (3) working days after the incident. Bulk meters are replaced within four (4) working days after receipt of completed application form.
Resumption of service	Within one (1) working day after payment.
Broken pipes	Repaired within one (1) working day after the incident. Repair main line broken pipes within two (2) days after the incident.
Storm damage of water source	Repaired within four (4) working days after the incident.
Sewerage	
Connection	Done within five (5) working days after receipt of the completed application form.
Collection	Done within one (1) working day after receipt of the request.
Obstruction and damage	Repaired within one (1) day after the incident.

"Community involvement and excellent client services are the building blocks of Bergrivier Municipality"

Access to safe drinking water is essential to health and is human right. Safe drinking water that complies with the SANS:241 Drinking Water specifications do not pose a significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages. Bergrivier Municipality is therefore committed to ensure that their water quality always complies with national safety standards.

Barriers implemented by Bergrivier Municipality against contamination and deteriorating water quality include the following:

- Service Delivery Agreement between the West Coast District Municipality and Bergrivier Municipality. A Monitoring Committee with the following powers and functions are in place:
  - To co-ordinate integrated development planning in respect of the services;
  - To monitor the performance of the District Municipality in respect of service levels;
  - To monitor the implementation of this agreement;
  - To provide a forum for the local municipalities to interact with the District Municipality;
  - To accept delivery, on behalf of the Local Municipalities, of reports which the District Municipality is required to produce in terms of this agreement;
  - To consider and make recommendations to the District Municipality on the District Municipality's high level budget and key performance indicators and targets;
  - In consultation with the District Municipality, to handle, manage and make recommendations to the parties in respect of any matter related to the services which is not dealt with by this agreement;
  - To ensure that the expenses incurred by the District Municipality in respect of the services do not exceed the amount allocated therefore in the District Municipality's annual budget;
  - To formulate a written document that records the rules and procedures, which will be binding on itself, regulating the manner and legislative obligations, powers and functions to the Monitoring Committee.
- Participate in catchment management and water source protection initiatives.
- Protection at points of abstraction such as river intakes and dams (Abstraction Management).
- Correct operation and maintenance of the WTWs (Coagulation, flocculation, sedimentation and filtration).
- Protection and maintenance of the distribution systems. This includes ensuring an adequate disinfectant residual at all times, rapid response to pipe bursts and other leaks, regular cleaning of reservoirs, keeping all delivery points tidy and clean, etc.

Three other important barriers implemented by Bergrivier Municipality against poor quality drinking water that are a prerequisite to those listed above are as follows:

- A well-informed Council and municipal managers that understand the extreme importance of and are committed to providing adequate resources for continuous professional operation and maintenance of the water supply system.
- Competent managers and supervisors in the technical department who are responsible for water supply services lead by example and are passionate about monitoring and safeguarding drinking water quality.
- Well-informed community members and other consumers of water supply services that know how to protect the water from becoming contaminated once it has been delivered, that have respect for water as a precious resource and that adhere to safe hygiene and sanitation practices.

D. APPROVAL AND PUBLICATION RECORD

This Annual WSDP Performance- and Water Services Audit Report is for the 2017/2018 Financial Year and is hereby approved for submission to the Minister of the Department of Water and Sanitation, the Minister for the Department of Cooperative Governance, the Province and to SALGA, as required by the Water Services Act, 1997. The Municipality will endeavour to publicise a summary of the report.

This report will be available for inspection at the offices of the municipality and is available on the Municipality's website. A Copy of the report is obtainable at a fee as determined by the Municipality

RECOMMENDED:

Signature
Name: J Breunissen
Title: Manager: Civil Engineering Services

29/10/2018
Date

Signature
Name: H Kröhn
Title: Director Civil Engineering Services

29/10/2018
Date

APPROVED:

Signature
Name: H Linde
Title: Municipal Manager

29/10/2018
Date

REFERENCES

- SA Census Data (2011), Community Profiles.
- Water Services Act, Act 108 of 1997. Regulations under Section 9 of the Water Services Act, which include the water services audit as Section 10 of the Guidelines for Compulsory National Standards.
- DWS's Annual Water Services Development Plan Performance- and Water Services Audit Report Template, August 2014.
- DWS's 2014 Blue Drop Report.
- DWS's 2013 Green Drop Report.
- DWS's 2014 Green Drop Progress Report.
- DWS's All Towns Reconciliation Strategy Documents for each of the towns in Bergrivier Municipality's Management Area, Version 2 May 2016.
- Draft Municipal Services Strategic Assessment (MuSSA) for Western Cape, 2017, DWS.
- Bergrivier Municipality's Annual Water Services Development Plan Performance- and Water Services Audit Report for 2016/2017, WorleyParsons RSA.
- Bergrivier Municipality's Operational Budgets and Tariffs.
- Asset Register for Water and Sewerage Infrastructure Assets, June 2018.
- SDBIP of Bergrivier Municipality for 2017/2018.
- Socio-Economic Profile for Bergrivier Municipality, Provincial Treasury, 2017.

ATTENDANCE REGISTER (DISCUSSION OF DRAFT DOCUMENT)

ANNEXURE A

Monthly Billed Metered Consumption per category user per town

Monthly number of consumer units per category per town

Water balance models for the various distribution systems

WTWs flows and capacities

WWTWs flows and capacities

DWS's Scorecard for assessing the potential for WC/WDM efforts

ANNEXURE B

No Drop Spreadsheets and ILI for the various distribution systems

ANNEXURE C

Future Water Requirement Projection Models for the various distribution systems

ANNEXURE D

Water Quality Compliance Sample Results

Final Effluent Quality Compliance Sample Results

ANNEXURE E

Water and Sanitation Operational and Maintenance Budget

ANNEXURE F

Organogram (Water and Wastewater)

ANNEXURE G

Bergrivier Municipality's WSDP Performance- and Water Services Audit Report (DWS new template)