



BEAUFORT WEST MUNICIPALITY

Disclaimer

This report has been prepared on behalf of and for the exclusive use of BEAUFORT WEST MUNICIPALITY, and is subject to and issued in accordance with the agreement between BEAUFORT WEST MUNICIPALITY and Worley Parsons RSA (Pty) Ltd. Worley Parsons RSA (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 BEAUFORT WEST MUNICIPALITY and Worley Parsons RSA (Pty) Ltd is not permitted.

Version Control:

Status	Description	Date	Reference
Version 1	Draft 2014/2015 Annual WSDP Performance- and Water Services Audit Report	October 2015	Project No. 270930-017
Approval	Final 2014/2015 Annual WSDP Performance- and Water Services Audit Report	Will be submitted with Annual Report	Council Resolution for approval will be forwarded by the Mun. to the DWS.

Prepared by:

Designation	Name	Contact No.	E-mail
Director Engineering Services	Mr JCL Smit	023 414 8102 / 083 417 6463	louw@beaufortwestmun.co.za
Technical Services	Mr CB Wright	023 414 8101 / 084 402 6007	manager.techservice@beaufortwestmun.co.za
Engineer	Jaco Human	021 912 3000 / 084 431 8728	jaco.human@worleyparsons.com

PROJECT 270930-017 - BEAUFORT WEST MUNICIPALITY: ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2014/2015

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
Draft	Draft issued for external review	R Kuffner Author	JT Human A Reviewer	Approval	31/10/2015	Approval	
Final	Final issued for Council approval	R Kuffner Author	JT Human A Reviewer	Approval		Approval	



FOREWORD:

Beaufort West 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 water services audit is designed to monitor the compliance of Beaufort West Municipality with these regulations. It also assists the communities within Beaufort West 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).

Beaufort West Municipality is performing very well with regard to drinking water quality management, to the extent that the Municipality was awarded Blue Drop Status (>95%) for their Beaufort West distribution system in 2012 and received an overall Blue Drop Score of 94.91%. The Municipality was in 24th position on the National Performance Log.

The 2013 Blue 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 distribution system and WTW, compared to the previous year's risks profile. The Blue Drop Risk Ratings for the three distribution systems presented were all between 40% and 50%. The Beaufort West Municipality was commended on their continued efforts of ensuring improved drinking water quality management.

Beaufort West Municipality is also performing very well with regard to wastewater quality management, to the extent that the Municipality was awarded Green Drop Status (>90%) for their Beaufort West drainage system and WWTW in 2013 and received an overall Green Drop Score of 79.55%. The Merweville and Nelspoort drainage systems and WWTWs further just missed the Green Drop Certification, with scores of 88.7% and 89.08% respectively. The DWS commended that the team's preparation was exemplary, with special reference to the commitment of the Technical Director and Mrs de Bod, as well as the extended time offered to finalise the audits. The inspection panel remarked; "...the municipal team knows their business and display a positive attitude towards the employer..."

The Municipality is in the process of reducing their very high NRW figures. Various pressure management projects were implemented in Beaufort West, which was started in 2010, and the Municipality also completed detail water meter audits in order to ensure that all water consumption is metered. The financial metering system of the Municipality will also be upgraded in order to ensure that all free basic water is also registered on the system. The long term WC/WDM Strategy was approved by Council on the 14th of November 2012 and the Municipality is in the process of implementing the Strategy. Funding of R1 million was further received from the DWS to assist with meter replacements.

The current total bulk raw water consumption for all the towns in Beaufort West Municipality's Management Area for 2014/2015 was 5.4% less than the consumption in 2008/2009, before the drought situation.

The Municipality further continue with the augmentation of the various towns existing water sources in order to meet the future water requirements. Additional groundwater resources for Beaufort West are being investigated and the Municipality is also in the process of connecting the newly drilled borehole in Nelspoort to the existing system.



A Performance Management System and Customer Services and Complaints system is 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.

A comprehensive Customer Services and Complaints system (IGNITE) is also in place and 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. All water and sanitation related complaints are logged through the system in order to ensure quick response to complaints.

The water and sanitation services of Beaufort West Municipality is managed in a financial sustainable manner, with a surplus generated on the operation and maintenance budgets of these services for the 2014/2015 financial year.

Beaufort West Municipality also completed capital water projects to the value of R1.880 million (68.71% of the Budget) and sewerage capital projects to the value of R12.887 million (90.62% of the Budget) during the 2014/2015 financial year.



BEAUFORT WEST MUNICIPALITY

WATER SERVICES AUDIT FOR 2014/2015

ITEM	DESCRIPTION	PAGE
FOREWORD		ii
LIST OF TABLES AND FIGURES		vi
ABBREVIATIONS AND DEFINITIONS		x
KEY TERMS AND INTERPRETATIONS		xii
EXECUTIVE SUMMARY		xiv
BACKGROUND		1
Appointment		1
Purpose		1
SECTION A: WATER SERVICES AUTHORITY PROFILE		2
A.1. Map of Water Services Authority Area of Jurisdiction		2
A.2. Water Services Administration and Organization		3
A.3 Water Services Overview		4
SECTION B: WSDP PERFORMANCE REPORT		8
B.1 WSDP Reference and Status		8
B.2 Performance on Water Services Objectives and Strategies		8
B.3 Status of Water Services Projects		12
B.4 Past Financial Year Water Services Project Impact Declaration		13
SECTION C: WATER SERVICES AUDIT REPORT		14
C.1 Quantity of Water Services Provided (Water Balance)		14
C.2 Water Services Delivery Profile		19
C.2.1 User Connection Profile		19
C.2.2 Residential Water Services Delivery Access Profile		23
C.2.3 Residential Water Services Delivery Adequacy Profile		27
C.3 Cost Recovery and Free Basic Services		29
C.3.1 Tariffs		29
C.3.2 Metering, Billing and Free Basic Services		31
C.3.3 Revenue Collection and Cost Recovery		34
C.4 Water Quality		36



C.4.1	Sampling Programme	36
C.4.2	Water Quality Compliance	46
C.4.3	Incident Management.....	49
C.5	Water Conservation and Water Demand Management.....	51
C.6	Water Services Infrastructure Management	62
C.7	Associated Services	71
C.8	Water Resources	71
C.9	Institutional Arrangement Profile	80
C.10	Social and Customer Services Requirements	86
SECTION D: APPROVAL AND PUBLICATION RECORD		89

REFERENCES

ATTENDANCE REGISTER (DISCUSSION OF DRAFT REPORT)

ANNEXURES:

Annexure A:	Schematic layouts of the various distribution systems Water balances for the various distribution systems Rainfall and WWTW's flows and capacities WTW's flows and capacities
Annexure B:	ILI for the various distribution systems
Annexure C:	Water Quality Compliance Sample Results Final Effluent Quality Compliance Sample Results
Annexure D:	DWS's scorecard for assessing the potential for WC/WDM efforts
Annexure E:	Water and Sanitation Operational and Maintenance Budget
Annexure F:	Organogram (Water and Wastewater)



LIST OF TABLES AND FIGURES

TABLES

Table A.2.1	Water Services Administrative Structure.....	3
Table A.3.1	Summary of existing water and sewerage infrastructure	5
Table A.3.2	Definitions of Water Supply and Sanitation Services	5
Table A.3.3	Water Services Overview (Water).....	6
Table A.3.4	Water Services Overview (Sanitation).....	7
Table B.1.1	WSDP and Reporting Reference	8
Table B.2.1	Performance on Water Services Objectives and Strategies per WSDP Topic	9
Table B.3.1	Water Services Projects Status and Performance	12
Table B.4.1	Past Financial Year Project Impact Declaration	13
Table C.1.1	Bulk water supply to various towns	14
Table C.1.2	Quantity of Water Services Provided / Water Balance (m ³ /a & Ml/d).....	15
Table C.1.3	Quantity of water used by each user sector	16
Table C.1.4	Quantity of effluent received at the various WWTWs	17
Table C.1.5	Current effluent re-used practices at the various WWTWs	17
Table C.2.1.1	User Connection Profile (Water)	19
Table C.2.1.2	User Connection Profile (Wastewater).....	21
Table C.2.1.3	Number of consumer units in each user sector for 2014/2015	23
Table C.2.2.1	Residential water services delivery access profile: Water.....	23
Table C.2.2.2	Residential water services levels (Residential Consumer Units)	24
Table C.2.2.3	Residential water services delivery access profile: Sanitation	25
Table C.2.2.4	Residential sanitation services levels (Residential Consumer Units).....	26
Table C.2.3.1	Residential Water Services Delivery Adequacy Profile (Water)	27
Table C.2.3.2	Residential Water Services Delivery Adequacy Profile (Sanitation).....	28
Table C.3.1.1	Water tariffs	29
Table C.3.1.2	Sewerage tariffs.....	30
Table C.3.2.1	Overview of Metering, Billing and Free Basic Services	31
Table C.3.2.2	Detail water meter audit (2012/2013)	32
Table C.3.3.1	Overview of Water Services Revenue Collection and Cost Recovery	34
Table C.3.3.2	Summary of operational and maintenance budgets for water and sanitation services	34
Table C.3.3.3	Debtors as on the 30th of June 2015 for the various income sources	36
Table C.4.1.1	Sampling Programme for Potable Water Quality	36
Table C.4.1.2	Detail Sampling Programme for Water Quality	39
Table C.4.1.3	Current and required sampling for E.Coli in the distribution systems.....	39
Table C.4.1.4	Minimum monitoring frequency for process indicators.....	40
Table C.4.1.5	Sampling Programme for Wastewater Effluent Quality.....	41
Table C.4.1.6	Detail Sampling Programme for Wastewater Effluent Quality.....	41



LIST OF TABLES AND FIGURES / Continue

TABLES

Table C.4.1.7	Compliance to the Sampling Programme (s)	42
Table C.4.1.8	Water Quality Monitoring Overview from WSDP Guide Framework Perspective	42
Table C.4.1.9	Wastewater Quality Monitoring Overview from WSDP Guide Framework Perspective.....	43
Table C.4.1.10	Blue Drop Performance of the Municipality (DWS's 2012 Blue Drop Report).....	43
Table C.4.1.11	DWS's 2013 Blue Drop Risk Profile Progress Report results for Beaufort West Municipality.....	44
Table C.4.1.12	Green Drop Performance of the Municipality (DWS's 2013 Green Drop Report).....	45
Table C.4.2.1	Overview of Water Quality Compliance.....	46
Table C.4.2.2	Number of water quality compliance samples taken throughout the various water distribution systems over the period July 2014 to June 2015	46
Table C.4.2.3	Percentage compliance of the water quality samples for the period July 2013 to June 2014.....	47
Table C.4.2.4	Five categories under which the risks posed by micro-organism, physical or aesthetic property or chemical substance of potable water is normally classified.....	47
Table C.4.2.5	Overview of Wastewater Quality Compliance	48
Table C.4.2.6	Percentage Microbiological compliance of the compliance samples taken at the various WWTWs.....	48
Table C.4.2.7	Percentage chemical compliance of the compliance samples taken at the various WWTWs.....	48
Table C.4.2.8	Percentage physical compliance of the compliance samples taken at the various WWTWs.....	49
Table C.4.3.1	Incident Management and Reporting Overview	50
Table C.4.3.2	Water Quality Incident Reporting Compliance (Health Oriented).....	50
Table C.5.1	Overview of WC/WDM Activities	51
Table C.5.2	Non revenue water for the various distribution systems.....	53
Table C.5.3	Potential savings on bulk water supply through the implementation of pressure management	54
Table C.5.4	Summary of pressure management phases planned for Beaufort West	54
Table C.5.5	Summary of measured savings through pressure management	55
Table C.5.6	Long-Term WC/WDM Strategy of Beaufort West Municipality	56
Table C.6.1	Current and depreciated replacement cost of the water infrastructure - June 2014	62
Table C.6.2	Overview of the remaining useful life and age distribution by facility type for the water infrastructure – June 2014 (CRC)	63
Table C.6.3	Overview of the condition grading by facility type for the water infrastructure – June 2014 (CRC)	65
Table C.6.4	Risk category of all the poor and very poor assets per type for water infrastructure – June 2014 (CRC)	66
Table C.6.5	Current and depreciated replacement cost of the sewerage infrastructure – June 2014.....	66
Table C.6.6	Overview of the remaining useful life and age distribution by facility type for the sewerage infrastructure (CRC)	67



LIST OF TABLES AND FIGURES / Continue

TABLES

Table C.6.7	Overview of the condition grading by facility type for the sewerage infrastructure – June 2015 (CRC)	69
Table C.6.8	Risk category of all the poor and very poor assets per type for sewerage infrastructure – June 2015 (CRC).....	70
Table C.7.1	Service Levels at Schools	71
Table C.7.2	Service Levels at Medical Facilities.....	71
Table C.8.1	Further potential production boreholes drilled in Beaufort West	77
Table C.8.2	Pumping test results for two boreholes tested in Murraysburg	77
Table C.8.3	Years in which the annual water requirement will exceed the sustainable yield from the various resources	78
Table C.8.4	Potential future water resources for the various towns (DWS's Reconciliation Strategy)	78
Table C.9.1	Training provided during the 2014/2015 financial year (Workplace Skills Plan)	80
Table C.9.2	Municipal Strategic Self-Assessment (MuSSA) of Water Services for Beaufort West Municipality	82
Table C.10.1	Water and sanitation indicators monitored by Beaufort West Municipality with regard to customer services and maintenance work	86

FIGURES

Figure A.1.1	Location of Beaufort West Municipality in the Western Cape	2
Figure A.1.2	Beaufort West Municipality's Management Area.....	2
Figure C.1.1	Bulk water supply and non-revenue water for the various distribution systems	14
Figure C.1.2	Quantity of water services provided / water balance	16
Figure C.2.1.1	User connection profile for water.....	20
Figure C.2.1.2	User connection distribution for water – Year 2014/2015.....	20
Figure C.2.1.3	Number of new water connections provided during 2014/2015	20
Figure C.2.1.4	User connection profile for wastewater	22
Figure C.2.1.5	User connection distribution for wastewater – Year 2014/2015	22
Figure C.2.1.6	Number of new wastewater connections provided during 2014/2015.....	22
Figure C.2.2.1	Household water access profile	24
Figure C.2.2.2	Household sanitation access profile.....	25
Figure C.3.2.1	Water meters replaced or repaired	33
Figure C.3.3.1	Revenue collection and cost recovery profile (Water).....	35
Figure C.3.3.2	Revenue collection and cost recovery profile (Wastewater)	35
Figure C.5.1	System Input and Non-revenue Water for the Various Towns.....	52
Figure C.6.1	CRC and DRC of the Water Infrastructure.....	63
Figure C.6.2	Remaining Useful Life of the Water Infrastructure	64
Figure C.6.3	Age distribution of the Water Infrastructure.....	64



LIST OF TABLES AND FIGURES / Continue

FIGURES

Figure C.6.4	Condition grading of Water infrastructure	65
Figure C.6.5	Risk rating of poor and very poor graded Water infrastructure	66
Figure C.6.6	CRC and DRC of the Sewerage infrastructure.....	67
Figure C.6.7	Remaining Useful Life of the Sewerage Infrastructure.....	68
Figure C.6.8	Age distribution of the Sewerage Infrastructure	68
Figure C.6.9	Condition grading of Sewerage infrastructure	69
Figure C.6.10	Risk rating of poor and very poor graded Sewerage infrastructure.....	70
Figure C.8.1	Annual raw water supply to Beaufort West from various resources.....	72
Figure C.8.2	Percentage raw water supply to Beaufort West from various resources	72
Figure C.8.3	Annual groundwater supply to Merweville from the various boreholes	73
Figure C.8.4	Percentage raw water supply to Merweville from various boreholes.....	73
Figure C.8.5	Annual raw water supply to Nelspoort from the various resources.	74
Figure C.8.6	Percentage raw water supply to Nelspoort from the various resources.	74
Figure C.9.1:	Spider Diagram of the vulnerability levels of Beaufort West Municipality.....	82



ABBREVIATIONS AND DEFINITIONS

ACIP	Accelerated Community Infrastructure Programme
ADWF	Average Dry Weather Flow
BDS	Blue Drop Certification System
CES	Community Engineering Services
COD	Chemical Oxygen Demand
DM	District Municipality
CRC	Current Replacement Cost
DRC	Depreciated Replacement Cost
DWS	Department of Water and Sanitation
GAMAP	Drinking Water Quality
EC	Electrical Conductivity
GAMAP	General Accepted Municipal Accounting Practice
GDS	Green Drop Certification System
IDP	Integrated Development Plan
ILI	Infrastructure Leakage Index
Kl	Kilolitre
KPI	Key Performance Indicator
l/s	Litres per Second
LGAAC	Local Government Accounting Advanced Certificate
MFMA	Municipal Finance Management Act
MIG	Municipal Infrastructure Grant
MI	Mega litre
MI/a	Mega litre per year
MI/d	Mega litre per day
MuSSA	Municipal Services Strategic Assessment
NMR	No Monitoring Required
NRW	Non-revenue Water
O&M	Operation
ORHVS	Operating Regulations for High Voltage Systems
PAT	Progress Assessment Tool
PRV	Pressure Reducing Valve
RBIG	Regional Bulk Infrastructure Grant
RDP	Reconstruction and Development Programme
RPMS	Regulatory Performance Management System
RR	Risk Rating
RSA	Republic of South Africa
RUL	Remaining Useful Life
SA	South Africa
SALGA	South African Local Government Association
SANS	South African National Standards
SDBIP	Service Delivery Budget Implementation Plan
TSS	Total Suspended Solids



ABBREVIATIONS AND DEFINITIONS / Continue

UAW	Unaccounted for Water
VIP	Ventilated Improved Pit
WC/WDM	Water Conservation Water Demand Management
WDM	Water Demand Management
WMA	Water Management Area
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSP	Water Services Provider
WSI	Water Services Institution
WTW	Water Treatment Works
W ₂ RAP	Wastewater 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- <ul style="list-style-type: none"> 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.



BEAUFORT WEST MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2014/2015

EXECUTIVE SUMMARY

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 Water Services Audit every year.

The 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 Water Services Audit also assists local communities and the DWS to assess how well WSAs are performing relative to their stated intentions and their capacity.

The Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2014/2014 financial year, and can be seen as an annexure to Beaufort West 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 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 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 Water Services Audit Report contains the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2013/2014 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 waste water quality management.
- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.
- Information to be included in a 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 Water Services Audit Report for 2013/2014 was finalised and approved by Council as part of the Annual Report. The non-revenue water balance models were also updated for each of the distribution systems (Up to the end of June 2014) as part of the Water Services Audit Process.
- Beaufort West Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). All the WTWs and WWTWs are also registered on the BDS and GDS websites.
- A MIG Technical Report was compiled for the upgrading of the Nelspoort WWTW.
- The Asset Register was updated to include the water and sewerage projects completed during the 2014/2015 financial year.

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

- Beaufort West Municipality is performing very well with regard to drinking water quality management, to the extent that the Beaufort West distribution system was awarded Blue drop status (96.27%) by the DWS for their 2012 assessment. The Merweville and Nelspoort distribution systems also performed very well at 86.43% and 74.45% respectively. **The Municipality's overall Blue Drop Score was 94.91% and the Municipality was 24th on the 2012 National Log Position.**

The 2013 Blue Drop Risk Profile Progress Report of the DWS is the product of a "gap" year, whereby progress is reported in terms of the improvement or decline in the risk position of the particular distribution system and WTW, compared to the previous year's risks profile. The Blue Drop Risk Ratings for the three distribution systems presented were all between 40% and 50%. The Beaufort West Municipality was commended on by the DWS for their continued efforts of ensuring improved drinking water quality management.

- Beaufort West Municipality is also performing very well with regard to wastewater quality management, to the extent where the Beaufort West drainage system was awarded Green drop status (93.73%) by the DWS for their 2013 assessment. The Municipality also received a Green Drop Score of 88.70% for the Merweville drainage system and a Green Drop Score of 89.08% for the Nelspoort drainage system. The Murraysburg drainage system is however failing on all eight (8) Green Drop criteria and received a Green Drop Score of only 12.45%. **The Municipality's overall Green Drop Score was 79.55%.**
- Beaufort West Municipality achieved 100% MIG expenditure for the 2014/2015 financial year.

Quantity of Water Services Provided (Water Balance)

Detail water balance models are in place for each of the distribution systems in Beaufort West Municipality's Management Area. These models include the volume of raw water abstracted from the various resources, the treated volume supplied from the WTW and the billed metered consumption for each of the distribution systems. The volume and percentage of water losses and NRW were also calculated from the available data. The flows at each of the WTWs and WWTWs are also recorded by the Municipality.



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 Beaufort West Municipality's Management Area are provided with water connections inside the houses. Informal areas are supplied with shared services as an intermediary measure. Beaufort West Municipality is committed to support the private landowners as far as possible in order to ensure that the households with existing water and sanitation services still below RDP standard are provided with at least basic services. To adequately monitor the provision of basic water and sanitation services on privately owned land is however a big challenge for the Municipality.

Cost Recovery and Free Basic Services

A detail step block tariff system is implemented by Beaufort West Municipality. 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. Drought tariffs are also in place. The sustainable supply of potable water is however becoming an ever increasing challenge.

The first six (6) kl of water is provided free to all indigent consumers. Beaufort West 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-subsidies consumers who use up to six (6) kilolitres per month.

The table below gives a summary of Beaufort West Municipality Operational and Maintenance Expenditure and Income Budgets for water and sanitation services for the last five years.

Description	Actual 14/15	Actual 13/14	Actual 12/13	Actual 11/12	Actual 10/11
Water Services (Admin Water, Irrigation Water, Water Purification, Water Reticulation and Water Murraysburg)					
Expenditure	R22 548 681	R20 811 509	R21 806 909	R19 679 510	R15 115 143
Income	-R26 133 367	-R21 600 276	-R15 993 196	-R12 842 533	-R39 592 872
Surplus / Deficit	-R3 584 686	-R788 767	R5 813 713	R6 836 977	-R24 477 729
Sanitation Services (Sewerage System, Sewerage Farm, Vacuum Services)					
Expenditure	R7 671 591	R5 932 047	R4 905 700	R5 500 523	R3 995 653
Income	-R25 863 515	-R17 348 523	-R17 317 811	-R9 227 059	-R10 503 026
Surplus / Deficit	-R18 191 924	-R11 416 476	-R12 412 111	-R3 726 536	-R6 507 373

Water Quality

Operational and Compliance Water Quality and Final Effluent Monitoring Programmes are implemented by the Municipality. The percentage compliance of the water quality samples taken over the period July 2014 to June 2015 for the various distribution systems are summarised in the table below (DWS's 2014 Blue Drop Limits).

Distribution System	Acute Health – 1 Microbiological	Chronic Health	Aesthetic	Risk assessment defined Health (Acute or Chronic)	Operational Efficiency
Beaufort West	100.0%	97.9%	99.7%	98.7%	98.0%
Merweville	100.0%	96.2%	100.0%	96.9%	97.1%
Nelspoort	100.0%	97.9%	76.6%	97.9%	84.4%
Murraysburg	100.0%	100.0%	98.2%	100.0%	95.2%



The overall percentage compliance of the final effluent samples taken over the period July 2014 to June 2015 at the various WWTWs is summarised in the table below.

WWTW	Microbiological	Chemical	Physical
Beaufort West	100.0%	85.4%	97.2%
Merweville	-	100.0%	100.0%
Nelspoort	91.7%	77.8%	50.0%
Total	95.8%	86.2%	85.7%

WC/WDM

Beaufort West Municipality has made significant progress in implementing specific WC/WDM interventions. A detailed water meter audit was carried out during 2008/2009. A Long Term WC/WDM Strategy was further developed for Beaufort West Municipality during June 2011, with funding support from the DWS. The WC/WDM Strategy was taken to Council on the 14th of November 2012. A four block step tariff system is implemented by the Municipality, which discourage wasteful or inefficient use of water. The Municipality continued with the further implementation of Pressure Management measures in the Beaufort West distribution system, which was started in 2010.

The existing NRW for the various distribution systems are very high and it is estimated that it is as a result of the billing system. The Municipality replaced various prepaid water meters over the last financial year in order to ensure that their future consumption is registered through the financial system. The water losses on the bulk distribution system, which include the treatment losses, were less than 6% for the last financial year. The high losses are on the internal distribution system, due to inaccurate billing records and the pre-paid metering system used for the free water. The completion of the new billing system will ensure accurate communication between the individual meters and the Municipality's Financial System.

The table below gives a summary of the NRW for the various distribution systems in Beaufort West Municipality's Management Area.

Description	Unit	14/15	Record : Prior (MI/a)			
			13/14	12/13	11/12	10/11
Beaufort West	Volume	1 261.822	1 196.249	1 229.356	1 040.564	705.594
	Percentage	49.7%	50.3%	49.7%	48.7%	42.5%
	ILI	5.54	5.35	6.08	5.15	3.61
Merweville	Volume	48.906	42.797	17.063	16.177	5.322
	Percentage	43.1%	41.9%	18.4%	18.3%	7.7%
	ILI	13.90	12.23	5.03	4.32	1.98
Nelspoort	Volume	89.556	80.903	67.251	51.672	21.761
	Percentage	67.3%	64.0%	58.4%	45.3%	21.0%
	ILI	9.24	8.34	7.37	5.65	3.68
Murraysburg	Volume	Bulk water meter readings not yet available				
	Percentage					
	ILI					
TOTAL	Volume	1 400.284	1 319.949	1 313.670	1 108.413	732.677
	Percentage	50.29%	50.64%	49.02%	47.39%	39.96%
	ILI	6.01	5.76	6.32	5.32	3.71

Notes: 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

The most significant challenges, from a Water Services perspective, are the augmentation of the existing groundwater resources for Beaufort West, upgrading of the Nelspoort and Murraysburg oxidation ponds, the refurbishment and upgrading of the existing water and sewer networks and pump stations and to ensure the provision of basic services to rural communities located on private farms. Beaufort West Municipality will continue to develop strategies and action plans, in collaboration with farm owners, in order for the Municipality to fulfil its legal obligations and responsibilities as WSA for the provision of basic services.

The CRC, DRC, RUL, Age and Condition distribution and Risk Categories of the water and sewerage infrastructure assets of Beaufort West Municipality, as included in the Financial Asset Register for the 30th of June 2015, is summarised in the tables below:

Asset Category	CRC	DRC	% CRC / DRC
Water Infrastructure	R291 989 915	R128 729 629	44.1%
Sewerage Infrastructure	R130 127 009	R75 823 444	58.3%

The above table means that 55.91% of the value of the water infrastructure and 41.7% of the value of the sewerage infrastructure has been consumed.

RUL					
Asset Category	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Water Infrastructure	R88 017 964	R28 555 647	R5 590 916	R4 659 705	R165 165 684
Sewerage Infrastructure	R7 790 453	R274 408	R 2 171 815	R 11 571 194	R 108 319 138
Age Distribution					
Asset Category	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
Water Infrastructure	R28 505 514	R20 861 603	R14 643 693	R16 038 194	R211 940 910
Sewerage Infrastructure	R36 461 452	R14 730 683	R7 466 346	R2 955 616	R68 512 911

The average water asset renewal needs over the next 10 years is R11.66 million per year and the reinvestment required is R88.018 million in the first 5 years and R28.556 million in the second 5 year period. The asset renewal needs for the sewerage infrastructure assets over the next 10 years is R0.806 million per year. The reinvestment required is R7.790 million in the first 5 years and R0.274 million in the second 5 year period. The age of 52.7% of the sewerage infrastructure assets is greater than 20 years.

Condition					
Asset Category	Very Good	Good	Fair	Poor	Very Poor
Water Infrastructure	R66 128 989	R70 619 214	R48 186 503	R89 469 650	R17 585 559
Sewerage Infrastructure	R55 147 654	R13 905 283	R51 941 418	R8 031 828	R1 100 826
Risk Categories for the Poor and Very Poor Assets					
Asset Category	Significant	High	Moderate	Low	
Water Infrastructure	R14 100 362	R17 797 168	R75 157 679	R0	
Sewerage Infrastructure	R1 096 826	R0	R8 035 828	R0	

About 36.7% of the water supply infrastructure is in a poor or very poor condition and the condition backlog is in the order of R107.1 million. The bulk of the backlog is made up of bulk water pipeline, water reticulation pipeline and reservoir assets. About 7.0% of the sewerage infrastructure is in a poor or very poor condition and the condition backlog is in the order of R9.133 million. The bulk of the backlog is made up of the sewer drainage networks.

One of the key challenges of Beaufort West Municipality is to identify adequate funds for the rehabilitation and maintenance of the existing infrastructure, which is critical to ensure the sustainability of the services that are provided by the Municipality.



Associated Services

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

Water Resources

All the surface and groundwater sources are all supplied with bulk water meters, which are read weekly by the Beaufort West Municipality's personnel and is a valuable source of information in terms of the water balances for the various distribution systems. The existing water sources in Beaufort West and Nelspoort are under constant pressure to meet the future demands and further exploitation of additional groundwater sources is taking place. The table below gives an overview of the years in which the annual water requirement is likely to exceed the safe yields from the various resources.

Distribution System	Total sustainable Yield ($\times 10^6 \text{ m}^3/\text{a}$)	Annual Growth on 2012/2013 Demand (1.5% or 3.5%)	Annual Growth on 2012/2013 Demand (3.5% or 5.5%)	WSDP Projection Model
Beaufort West (Incl. Hansrivier and Small Hansrivier)	3.192	2022 (2%)	2018 (3.5%)	2036
Merweville	0.322	> 2037 (1%)	> 2037 (2%)	> 2037
Nelspoort (Incl. Weir borehole)	0.412	> 2037 (1%)	> 2037 (2%)	> 2037
Murraysburg (Incl. MB Rugby Bh3 & MB Hostel Bh4)	0.198	Future Water Demand Projection Model not yet in place		

GEOSS was tasked to conduct several hydrogeological investigations to identify areas where additional groundwater could be sourced for Beaufort West town supply. Based on the investigations conducted by GEOSS the following were recommended in their "A Regional reconnaissance investigation to identify areas for groundwater development in Beaufort West, May 2007" Report:

- Proceed with the utilisation of Brandwag 5. Brandwag 5 must be pumped at a maximum yield of 2.0 l/s for 12 hours – short term option **(Was started by Beaufort West Municipality in November 2007)**.
- Conduct a monthly water quality monitoring programme together with the routine monthly water level monitoring– short term option **(Implemented by Beaufort West Municipality)**.
- Re-drill a new borehole next to G29877L; Pump test the newly drilled borehole and scientifically assess its groundwater potential; Assess the Droërvier area to determine whether there are any existing boreholes that can be used for augmentation; Depending on the outcome of the assessment, decide to site and drill additional boreholes here – short term option **(Implemented by Beaufort West Municipality)**.
- Conduct a groundwater exploration programme to source additional groundwater in sub areas D, B, C and A in order of priority – medium term option **(Busy with implementation)**.
- Consider the desalinisation of treated sewage water – medium term option **(Implemented by Beaufort West Municipality)**.
- Investigate future desalinisation options in the eastern parts of the Hans River cadastral farm property – medium term option **(Implemented by Beaufort West Municipality)**.
- Investigate future desalinisation options in the Lower Plaatdoorns area – long term option.



Following on from the recommendations of the Hydrocensus Report, GEOSS was appointed to conduct borehole drilling and testing at locations sited based on the hydrocensus and geophysics. A total of nine boreholes were drilled, and a total of 11 boreholes (newly drilled and existing) were identified for yield testing. With the exception of borehole RK1 (Target Area 1) all the drilled and tested boreholes are located in Target Area 3. Of the 11 boreholes identified for testing, only 4 boreholes had sufficiently high yields and sufficient recovery to be utilised. In addition to these, there are an additional 2 existing boreholes in the Target Area 3 which have been tested previously (GEOSS, 2011) and can be utilised as a groundwater source.

Institutional Arrangement Profile

Beaufort West Municipality is the official WSA for the entire Municipal Management Area and act as the WSP for the area. An approved 2013/2014 WSDP is in place. A comprehensive set of water services by-laws is also in place. A Service Level Agreement with Water and Wastewater Engineering, converted to NEWATER for the Beaufort West Reclamation Plant, is also in place for the operation of the plant.

At a technical, operations and management level, municipal staff is continuously exposed to training opportunities, skills development and capacity building in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled every year 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 (IGNITE) is in place at Beaufort West 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.

The quality of potable water (Chemical and Biological) is monitored at the various locations within the distribution systems and tested at an accredited laboratory. The EHPs of the Central Karoo District Municipality also monitors the water quality. Barriers implemented by Beaufort West Municipality against contamination and deteriorating quality include:

- Participate in catchment management and water source protection issues.
- Correct operation and maintenance of the disinfection plants.
- Protection and maintenance of the distribution system. 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.

Four other important barriers against poor quality drinking water that are a prerequisite to those listed above are:

- 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.
- A Service Delivery Agreement with Water and Wastewater Engineering, converted to NEWATER for the operation of the Beaufort West Reclamation Plant.
- 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.



BEAUFORT WEST MUNICIPALITY

ANNUAL WSDP PERFORMANCE AND WATER SERVICES AUDIT REPORT FOR 2014/2015

BACKGROUND

Appointment

WorleyParsons RSA was appointed by Beaufort West Municipality to assist them with the compilation of their Water Services Audit Report, which forms part of their annual report for the 2014/2015 financial year. The purpose of the Water Services Audit Report is to report on the implementation of Beaufort West Municipality's previous year's WSDP, for the 2014/2015 financial year.

The DWS developed a new "Annual Water Services Development Plan Performance- and Water Services Audit Report" template during 2014, to assist Municipalities with the drafting of their reports. WorleyParsons RSA agreed with Beaufort West Municipality to follow this template as far as possible.

Purpose

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 water services audit every year. The 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 Water Services Audit Report will give an overview of the implementation of the Municipality's previous year's WSDP, for the 2014/2015 financial year, and can be seen as an annexure to Beaufort West 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 Water Services Audit Report contains the following detail information:

- The Municipality's performance with regard to their KPIs for water and sewerage services for the 2014/2015 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 waste water quality management.
- DWS's Scorecard for assessing the potential for WC/WDM efforts in the Municipality.
- Information to be included in a 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

Beaufort West Municipality is located in the Central Karoo Region of the Western Cape, as indicated on the figure below.

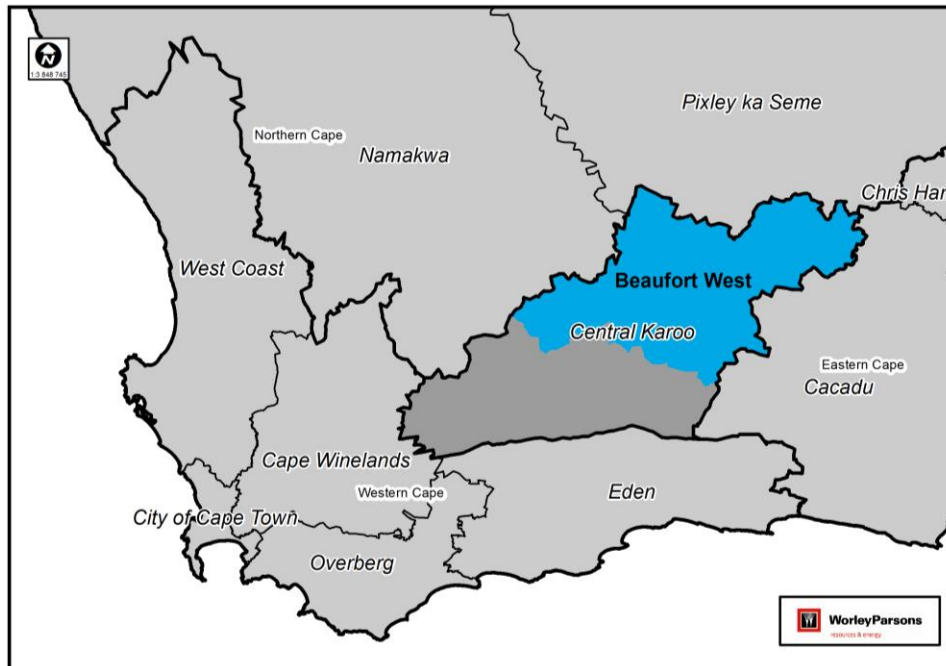


Figure A.1.1: Location of Beaufort West Municipality in the Western Cape

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

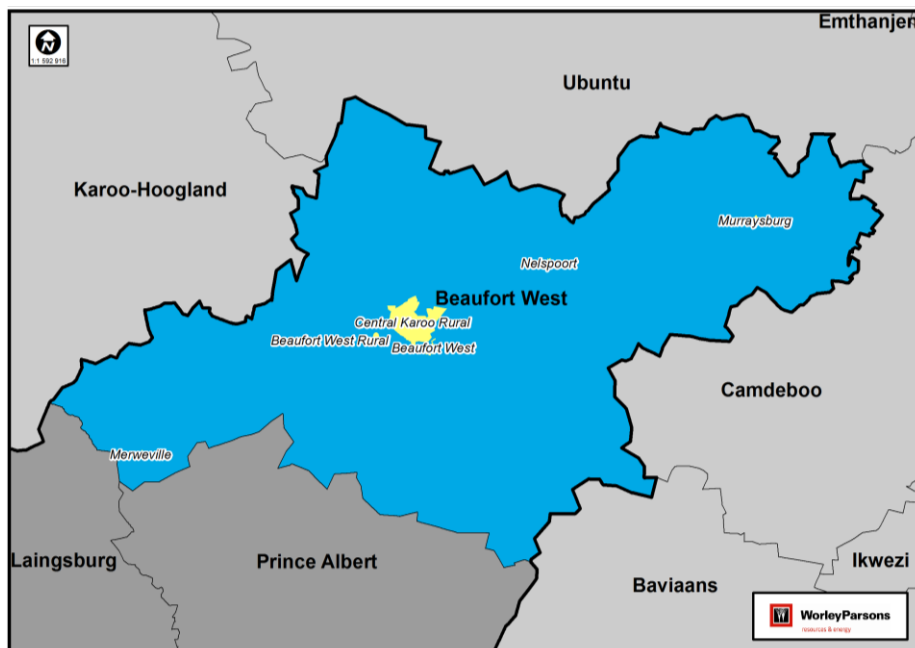


Figure A.1.2: Beaufort West Municipality's Management Area



The various schemes supplied with bulk water by Beaufort West 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 (Module 2).

A.2. Water Services Administration and Organization

Beaufort West Municipality is the WSA for the entire Municipal Management Area. Beaufort West Municipality's Organogram for Engineering Services are included in Annexure F. The table below gives the contact details of the persons responsible for water services management and planning within Beaufort West Municipality.

Table A.2.1: Water Services Administrative Structure	
Accounting Officer	
Designation	Municipal Manager
Name	Mr J Booysen
Telephone Nr.	023 414 8022
Fax Nr.	023 415 1373
Cell Nr.	083 390 5663
Email	jaffie@beaufortwestmun.co.za
WSA Manager	
Designation	Director: Engineering services
Name	Mr JCL Smit
Telephone Nr.	023 414 8102
Fax Nr.	086 600 8102
Cell Nr.	083 417 6463
Email	louw@beaufortwestmun.co.za
WSP Manager	
Designation	Director: Engineering services
Name	Mr JCL Smit
Telephone Nr.	023 414 8102
Fax Nr.	086 600 8102
Cell Nr.	083 417 6463
Email	louw@beaufortwestmun.co.za
WSDP Manager	
Designation	Manager: Technical Services
Name	Mr CB Wright
Telephone Nr.	023-414 8101
Fax Nr.	023-415 2811
Cell Nr.	084 402 6007
Email	manager.techservice@beaufortwestmun.co.za
IDP Manager	
Designation	Acting IDP Manager
Name	Mr LP Lakay
Telephone Nr.	023-414 8027
Fax Nr.	023-415 1373
Cell Nr.	078 638 6053
Email	idpmanager@beaufortwestmun.co.za



A.3. Water Services Overview

Beaufort West is within the Central Karoo District Municipal Area of the Western Cape Province and falls within the newly established Breede-Gouritz WMA. 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). Its responsibility as WSA also extends to the rural areas within its boundary. Beaufort West Municipality's Management includes the following areas:

- The large town of Beaufort West.
- The small towns of Merweville, Nelspoort and Murraysburg.
- The rural farm areas.

Water is supplied via independent water distribution systems to Beaufort West, Merweville, Nelspoort and Murraysburg. Beaufort West and Nelspoort are reliant on surface and groundwater sources, while Merweville and Murraysburg only utilise groundwater sources. Beaufort West Municipality also operates its own WTWs and WWTWs.

Beaufort West: The town relies on a number of groundwater sources, as well as on surface water supplied from the Gamka Dam. The raw water is treated at the WTWs, which consist of flocculation, stabilisation, filtration and chlorination, where after it is distributed to the consumers. The capacity of the WTW is 4.32 MI/day. Three bulk storage reservoirs are available, which are used to store treated water for supply to users in Beaufort West. The sizes of the three reservoirs are 4.55 MI (x2) and 5.75 MI, providing a total treated water storage capacity of 14.85 MI.

A total of 75.4 km of pipes, ranging from 75mm dia to 375mm dia transfer bulk water within the Beaufort West area. The potable water reticulation network consists of a total of 161.6 km of pipework ranging from less than 45mm dia to 675mm dia. There are three pump stations with pumps ranging from 18.5 kW to 45 kW and operating at heads between 50m and 85m.

Beaufort West is fully serviced with a formal sewer reticulation system. The reticulation system consists of 126.7 km of gravity pipelines and 1.1 km of rising mains. There are three sewer pump stations operated by Beaufort West Municipality with 8 l/s capacity each. The capacity of the Beaufort West WWTWs is 4.659 MI/day.

Merweville: The town relies on seven boreholes for bulk water supply to the town. The raw water is chlorinated before it is distributed to the consumers. Two bulk storage reservoirs are available, which are used to store treated water for supply to users in Merweville. The sizes of the two reservoirs are 0.2 MI each, providing a total treated water storage capacity of 0.4 MI.

The potable water reticulation network consists of a total of 2.6 km of pipework ranging between 75mm dia and 125mm dia. There are no internal water pump stations.

Merweville is partly serviced with a formal sewer reticulation system (New area). The reticulation system consists of 4.4 km of gravity pipelines. There are no sewer pump stations and the sewage gravitates to the oxidation dams.

Nelspoort: The town relies on two boreholes, as well as on surface water supplied from the Sout River. A third production borehole will be commissioned in the near future to assist with supply during drought periods. The raw water is treated at the WTW, which consists of filtration and chlorination, where after it is distributed to the consumers. One bulk storage reservoir with a capacity of 0.911 MI is available, which is used to store treated water for supply to users in Nelspoort.

A total of 0.65 km of pipes, ranging between 125mm dia and 275mm dia transfer bulk water within the Nelspoort area. The potable water reticulation network consists of a total of 6.1 km of pipework ranging from 45mm dia to 275mm dia. There is one pump station at the WTW with two pumps of 18.5 kW and operating at a head of 53m.



Nelspoort is fully serviced with a formal sewer reticulation system. The reticulation system consists of 5.1 km of gravity pipelines and 0.8 km of rising mains. There are two sewer pump stations operated by Beaufort West Municipality with capacities of 10 l/s and 13 l/s. The sewage from the Main sewer pump station is pumped to the oxidation dams. The Municipality is currently busy with the upgrading of the WWTW.

Murraysburg: The town is divided into two main sections called the North and Southern Section. Each of these Sections receives water from its own groundwater sources. Five production boreholes supply potable water to the town. There is no WTW or any water pump stations and the water gravitates from the storage reservoirs to the consumers. There is one sewer pump station from where the sewage is pumped through a rising main to the oxidation dams. The Municipality plan to upgrade the WWTW in the nearby future.

Beaufort West Municipality is responsible for the operation and maintenance of the water and sewerage infrastructure summarised in the table below:

Table A.3.1: Summary of Beaufort West Municipality's existing water and sewerage infrastructure	
Component	Description of the main functional tasks
Boreholes, Gamka Dam and Sout River	Bulk water abstraction
Bulk Pipelines (81 km)	Bulk delivery (Exclude Murraysburg)
Water Reticulation (195km)	Distribution of potable water to consumers (Exclude Murraysburg)
Water Pump Stations (5)	Ensure adequate pressure and supply to specific areas
Reservoirs (10)	Balancing peak demands and providing some emergency storage
WTWs (3)	Beaufort West: Flocculation, Stabilisation, Filtration and Chlorination. Merweville only chlorination. Nelspoort Filtration and Chlorination. Murraysburg No treatment
Sewer Reticulation (143km)	Collecting sewerage (Exclude Murraysburg)
Sewer Pump Stations (6)	Pumping sewerage to WWTWs
WWTWs (4)	Beaufort West (Activated Sludge), Merweville, Nelspoort and Murraysburg (Oxidation dams)

Every WSA has a duty to ensure that at least a basic water supply and sanitation service is provided to every household within its area of jurisdiction. The definition of basic water supply and sanitation services are summarised in the table below:

Table A.3.2: Definitions of Water Supply and Sanitation Services	
Basic water supply facility	The infrastructure necessary to supply 25 litres of potable water per person per day supplied within 200 metres of a household and with a minimum flow of 10 litres per minute (in the case of communal water points) or 6 000 litres of potable water supplied per formal connection per month (in the case of yard or house connections).
Basic water supply service	The provision of a basic water supply facility, the sustainable operation of the facility (available for at least 350 days per year and not interrupted for more than 48 consecutive hours per incident) and the communication of good water-use, hygiene and related practices.
Basic sanitation facility	The infrastructure necessary to provide a sanitation facility which is safe, reliable, private, protected from the weather and ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, and enables safe and appropriate treatment and/or removal of human waste and wastewater in an environmentally sound manner.
Basic sanitation service	The provision of a basic sanitation facility which is easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices.

The population figure for Beaufort West Municipality in 2001 was 37 106 (8 994 households). This figure increased substantially to 49 586 in 2011 (13 091 households).

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 tables below give an overview of the water and sanitation services in Beaufort West Municipality's Management Area.

Table A.3.3: Water Services Overview (Water)														
Settlement Type	2011/2012		2014/2015		Water category									
	Households	Population	Households	Population	Adequate: Formal	Adequate: Informal	Adequate: Sahrred 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		
	0	0	0	0										
Sub-Total	0	0	0	0										
Formal Town					Adequate		Below RDP					None		
Beaufort West	8,867	34,025	9,273	35,582	P		P							
Merweville	435	1,552	455	1,625	P		P							
Nelspoort	408	1,699	420	1,750	P		P							
Murraysburg	1,249	5,039	1,306	5,271	P		P							
Sub-Total	10,959	42,315	11,455	44,228										
Townships					Adequate		Below RDP					None		
	0	0	0	0										
Sub-Total	0	0	0	0										
Informal Settlements					Adequate		Below RDP					None		
Beaufort West	15	60	15	60		P								
Merweville	10	40	10	40		P								
Murraysburg	6	30	6	30		P								
Sub-Total	31	130	31	130										
Working towns & service centres					Adequate		Below RDP					None		
Sub-Total	0	0	0	0										
Sub-Total: (Urban)	10,990	42,445	11,486	44,358										
RURAL														
Rural / Farming					Adequate		Below RDP					None		
Beaufort West Rural	2,101	7,141	2,133	7,249	P		P							P
Sub-Total	2,101	7,141	2,133	7,249										
Informal Settlements					Adequate		Below RDP					None		
	0	0	0	0										
Sub-Total	0	0	0	0										
Sub-Total (Rural)	2,101	7,141	2,133	7,249										
TOTAL	13,091	49,586	13,618	51,606										

**Table A.3.4: Water Services Overview (Sanitation)**

Settlement Type	2011/2012		2014/2015		Sanitation category									
	Households	Population	Households	Population	Adequate: Formal	Adequate: Informal	Adequate: Shared 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	
	0	0	0	0										
Sub-Total	0	0	0	0										
Formal Town					Adequate					Below RDP			None	
Beaufort West	8,867	34,025	9,273	35,582	P		P							
Merweville	435	1,552	455	1,625	P		P							
Nelspoort	408	1,699	420	1,750	P		P							
Murraysburg	1,249	5,039	1,306	5,271	P		P							
Sub-Total	10,959	42,315	11,455	44,228										
Townships					Adequate					Below RDP			None	
	0	0	0	0										
Sub-Total	0	0	0	0										
Informal Settlements					Adequate					Below RDP			None	
Beaufort West	15	60	15	60		P								
Merweville	10	40	10	40		P								
Murraysburg	6	30	6	30		P								
Sub-Total	31	130	31	130										
Working towns & service centres					Adequate					Below RDP			None	
	0	0	0	0										
Sub-Total	0	0	0	0										
Sub-Total: (Urban)	10,990	42,445	11,486	44,358										
RURAL														
Rural / Farming					Adequate					Below RDP			None	
Beaufort West Rural	2,101	7,141	2,133	7,249	P		P							P
Sub-Total	2,101	7,141	2,133	7,249										
Informal Settlements					Adequate					Below RDP			None	
Sub-Total	0	0	0	0										
Sub-Total (Rural)	2,101	7,141	2,133	7,249										
TOTAL	13,091	49,586	13,618	51,606										



B. WSDP PERFORMANCE REPORT

B.1. WSDP Reference and Status

Beaufort West Municipality is currently busy updating their WSDP according to DWS's new web based WSDP system, which was introduced to all Municipalities during July 2015. The Municipality's previous WSDP was updated for the 2013/2014 financial year, according to DWS's WSDP guidelines (February 2012). The WSDP was approved by Council on the 26th of November 2013, Item 8.35. The table below gives an overview of the status.

Table B.1.1: WSDP and Reporting Reference						
Nr	WSDP Title and Reference	Status	Date	WSDP Year	Financial Year	Reporting year
1	Water Services Development Plan, Module 1, 2 and 3 (Update 2013/2014)	Drafted:	Jan - Apr 2013	Year 1	2011/12	Year -3
		Comment submit:	Apr - May 2013	Year 2	2012/13	Year -2
		Finalised:	May 2013	Year 3	2013/14	Year -1
		Adopted:	26 Nov 2013	Year 4	2014/15	Year 0
		Published:	Nov 2013	Year 5	2015/16	Year 1

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.

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic															
Nr	Objective	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		WSDP Year 5		
			FY 1	2011/12	FY 2	2012/13	FY 3	2013/14	FY 4	2014/15	FY 5	2015/16			
	Strategy		WSDP	IDP	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	
WSDP Topic 1: Administration															
WSDP Topic 2: Demographics															
WSDP Topic 3: Service levels															
3.1	Number of formal residential properties connected to the municipal waste water sanitation/sewerage network for sewerage service, irrespective of the number of water closets (toilets)	Number of residential properties which are billed for sewerage							11,938	11,542					
3.2	Install new pre-paid meters	% of the approved project budget spent							100	100					
3.3	Number of formal residential properties that receive piped water (credit and prepaid water) that is connected to the municipal water infrastructure network	Number of residential properties which are billed for water or have pre paid meters							11,938	11,977	11,938	11,650			
3.4	Provide free basic water to indigent households earning less than R2400 per month	Number of households receiving free basic water									5,682	5,790			
3.5	Provide free basic sanitation to indigent households earning less than R2400 per month	Number of households receiving free basic sanitation									2,661	2,890			
WSDP Topic 4: Socio economic															
WSDP Topic 5: Water Services Infrastructure															
5.1	Submit a report on the rehabilitation of the sanitation oxidation ponds in Nelspoort to MIG by 30 June	Report submitted to MIG by 30 June							1	1					
5.2	95% of the approved budget spent to install the sewerage pipeline and pump station in Buitekant Street Beaufort West by end June	% of the approved project budget spent							95	99	95	96.22			
5.3	Replace dosing pumps	% of the approved project budget spent							100	100					
5.4	Upgrade & extend the water supply in Murraysburg (MIG 1)	% of the approved project budget spent							95	99					
5.5	Upgrade the water Supply in Murraysburg (MIG 2)	% of the approved project budget spent							95	99					
5.6	95% of the approved project budget spent to upgrade the water supply to Murraysburg by end June	% of the approved project budget spent							100	99	95	100			
WSDP Topic 6: Operation Maintenance															
6.1	Monitor the operations of the WWTW works in such a way that the permit conditions are satisfied	% of target achieved			100	100	100	100	100	100	100	100			
6.2	Maintain quality of final waste water outflow	% quality level					90	90	90	100	90	98			
6.3	Monitor the operations of the WTW purification works in such a way that the permit conditions are satisfied	% of target achieved			100	100	100	100	100	100	100	100			
6.4	Maintain water quality as per SANS 241 physical and micro parameters	% water quality level					95	100	95	100	95	100			

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

Table B.2.1: Performance on Water Services Objectives and Strategies per WSDP Topic														
Nr	Objective	Key Performance Indicator	Inclusion (yes/no)		WSDP Year 1		WSDP Year 2		WSDP Year 3		WSDP Year 4		WSDP Year 5	
			FY 1	2011/12	FY 2	2012/13	FY 3	2013/14	FY 4	2014/15	FY 5	2015/16		
	Strategy		WSDP	IDP	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
WSDP Topic 7: Associated services														
WSDP Topic 8: Conservation and Demand management														
8.1	Limit unaccounted water to less than 15% between source and sector meters	% of water unaccounted for between source and sector meters							15	6.22	15	4.79		
8.2	Complete the new pressure reduction of the water network except for central town	% of the approved project budget spent							95	100				
8.3	95% of the approved project budget spent to implement Water Conservation/Water Demand Management Plan with the replacement of water meters	% of the approved project budget spent									95	100		
WSDP Topic 9: Water Resources														
9.1	95% of the approved project budget spent to construct the new bulk water Supply to Nelspoort by end June	% of the approved project budget spent					20	5	95	99	95	101.14		
9.2	Exploration of Aquifers	% of the approved project budget spent			100	100	100	100	100	229				
WSDP Topic 10: Financial profile														
10.1	90% of the sanitation assets maintenance budget spent	% of maintenance budget spent							90	92.37	90	106		
10.2	90% of the water assets maintenance budget spent	% of maintenance budget spent							90	103.7	90	112		
WSDP Topic 11: Institutional Arrangements profile														
11.1	Report on the implementation of the Water Service Delivery Plan (Audit) to DWS by end October	Report submitted to DWS					1	1	1	1	1	1		
11.2	Revise the Water Services Development Plan and submit to Council for approval by the end of June	Revise the Water Services Development Plan and submit to Council					1	1	1	1				
WSDP Topic 12: Social and Customer service requirements														
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 Water Services Audit Report for 2013/2014 was finalised and approved by Council as part of the Annual Report. The non-revenue water balance models were also updated for each of the distribution systems (Up to the end of June 2014) as part of the Water Services Audit Process.
- Beaufort West Municipality continues with the implementation of their Drinking Water Quality and Effluent Quality Sampling Programmes (Both Operational and Compliance Monitoring). All the WTWs and WWTWs are also registered on the BDS and GDS websites.
- A MIG Technical Report was compiled for the upgrading of the Nelspoort WWTW.
- The Asset Register was updated to include the water and sewerage projects completed during the 2014/2015 financial year.

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

- Beaufort West Municipality is performing very well with regard to drinking water quality management, to the extent that the Beaufort West distribution system was awarded Blue drop status (96.27%) by the DWS for their 2012 assessment. The Merweville and Nelspoort distribution systems also performed very well at 86.43% and 74.45% respectively. **The Municipality's overall Blue Drop Score was 94.91% and the Municipality was 24th on the 2012 National Log Position.**

The 2013 Blue Drop Risk Profile Progress Report of the DWS is the product of a "gap" year, whereby progress is reported in terms of the improvement or decline in the risk position of the particular distribution system and WTW, compared to the previous year's risks profile. The Blue Drop Risk Ratings for the three distribution systems presented were all between 40% and 50%. The Beaufort West Municipality was commended on by the DWS for their continued efforts of ensuring improved drinking water quality management.

- Beaufort West Municipality is also performing very well with regard to wastewater quality management, to the extent where the Beaufort West drainage system was awarded Green drop status (93.73%) by the DWS for their 2013 assessment. The Municipality also received a Green Drop Score of 88.70% for the Merweville drainage system and a Green Drop Score of 89.08% for the Nelspoort drainage system. The Murraysburg drainage system is however failing on all eight (8) Green Drop criteria and received a Green Drop Score of only 12.45%. **The Municipality's overall Green Drop Score was 79.55%.**
- Beaufort West Municipality achieved 100% MIG expenditure for the 2014/2015 financial year.



B.3. Status of Water Services Projects

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

Table B.3.1: Water Services Projects Status and Performance

Nr	Project Title and Description	Inclusion		Total Project Cost R'000	Year 0 Performance - FY2014/15			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	Investigation of new Aquifers	Yes	Yes	R2,097	R348	R320	92%	MIG	Water	2014/2015	2016/2017	In Progress	-
2	Exploration Aquifers	Yes	Yes	R478	R0	R19		RBIG	Water	2012/2013	2016/2017	In Progress	-
3	Upg. & Ext. Water supply Murraysburg	Yes	Yes	R1,292	R0	R48		MIG	Water	2013/2014	2014/2015	Completed	2015
4	Bulk water supply Nelspoort	Yes	Yes	R3,448	R1,295	R1,491	115%	MIG	Water	2013/2014	2016/2017	In Progress	-
5	Equipment Office and Lab Equipment	Yes	Yes	R2	R2	R2	99%	CRR	Water	2014/2015	2014/2015	Completed	2015
6	Replacement of water meters	Yes	Yes	R1,000	R1,000	R0	0%	ACIP	Water	2014/2015	2015/2016	In Progress	-
7	Dosing pump	Yes	Yes	R40	R40	R0	0%	CRR	Water	2014/2015	2014/2015	Not done	-
8	Equipment: Artizan pumps	No	Yes	R50	R50	R0	0%	CRR	Water	2014/2015	2014/2015	Not done	-
9	Sew erage Services Housing	Yes	Yes	R9,891	R11,651	R9,891	85%	PAWC	Wastew ater	2014/2015	2014/2015	Completed	2015
10	Pumpstation area	No	Yes	R690	R0	R690		MIG	Wastew ater	2014/2015	2014/2015	Completed	2015
11	Upgrade Biological Filter	Yes	Yes	R700	R700	R0	0%	Loan	Wastew ater	2014/2015	2015/2016	In Progress	-
12	Equipment Sew erage Lines	Yes	Yes	R236	R210	R236	112%	CRR	Wastew ater	2014/2015	2014/2015	Not done	-
13	External sew erage pipeline: Rustdene - Buitekant Str.	Yes	Yes	R7,452	R1,560	R1,501	96%	MIG	Wastew ater	2012/2013	2016/2017	In Progress	-
14	External sew erage line	Yes	Yes	R85	R0	R85		CRR	Wastew ater	2014/2015	2014/2015	Completed	2015
15	Rehabilitate Oxidation ponds Nelspoort	Yes	Yes	R900	R100	R484	484%	MIG	Wastew ater	2013/2014	2015/2016	In Progress	-
	Total			R28,362	R16,957	R14,767	87%						



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

The impacts of the water and sewerage capital projects, which were implemented by Beaufort West 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	Upgrade sewer pump station Grenera	Sewer Pump Station	Plettenberg Bay	600	1740	Increase sewer pump station and bulk sewer drainage capacity
2	Upgrade of Gansvallei WWTW	WWTW	Plettenberg Bay	15902	46506	Ensure compliance with quality standards for final effluent discharged from WWTW
3	Housing services - Qolweni/Bossiegif	Sanitation Drainage Network	Qolweni / Bossiegif	698	1443	Increase sewer drainage capacity.
		Water Reticulation Network	Qolweni / Bossiegif	698	1443	Increase water reticulation network capacity.
4	Refurbishment of sewer pump (Kwanokuthula)	Sewer Pump Station	Kwanokuthula	800	2160	Increase sewer pump station and bulk sewer drainage capacity.
5	Reticulation upgrades & replacements	Water Reticulation Network	Plettenberg Bay	200	800	Reduce water wastage and increase security of supply.
6	Keurbooms water supply and abstraction	Tanks and Water Pumps	Plettenberg Bay	15902	46506	Increase raw water pump capacity (Increase security of supply).
7	Water demand management (Pressure Reduction)	WC/WDM	Plettenberg Bay	-	-	Reduce pressure in order to reduce the water losses and non-revenue water.
8	Supply to Kwanokuthula & surrounds	Reservoir, Water Pump Station, Reticulation	Kwanokuthula	5183	14017	Supply a higher level of service and ensure security of supply.
9	Water treatment works upgrades	WTW	WTW	15902	46506	Increase filtration capacity of WTW in order to comply with water quality standards.
10	Tools and Equipment	Other	Management Area	-	-	Ensure adequate operation and maintenance of existing networks.
Total				55885	161121	



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 Beaufort West Municipality's Management Area.

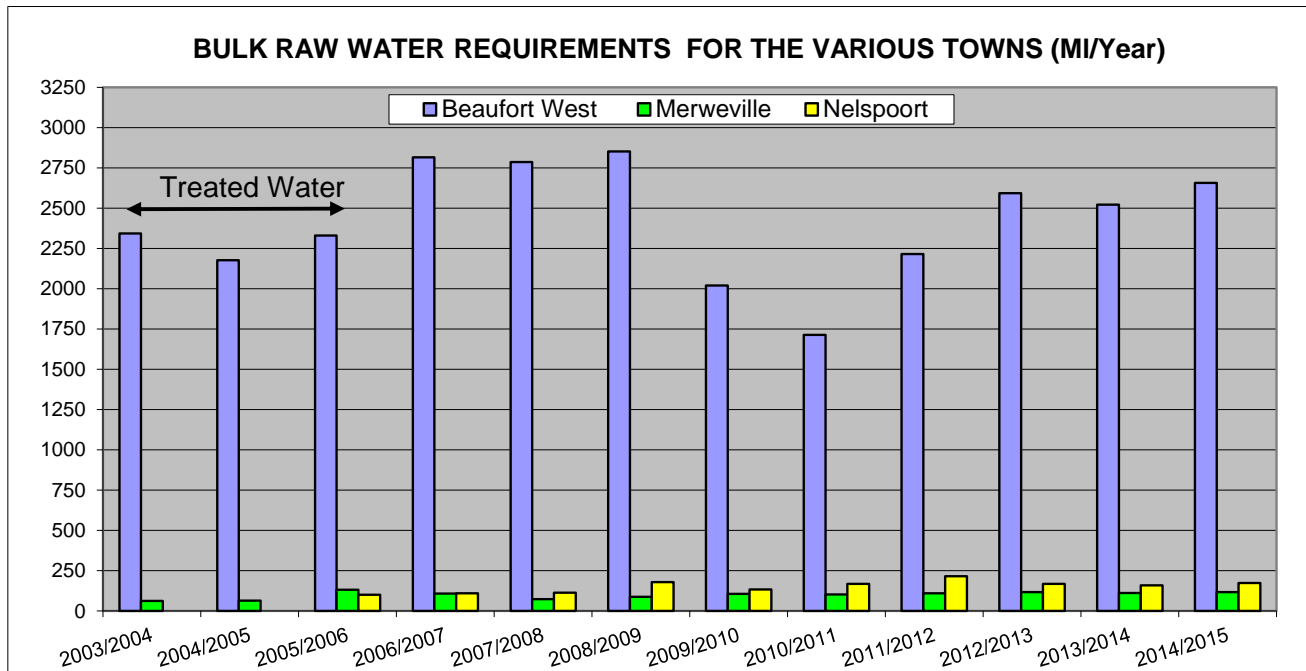


Figure C.1.1: Bulk water supply and non-revenue water for the various distribution systems

Quantity of water provided by the WSA

Table C.1.1: Bulk water supply to the various towns								
Distribution System	Source	14/15	Record : Prior (MI/a)					
			13/14	12/13	11/12	10/11	09/10	08/09
Beaufort West	Groundwater, Surface water and Reclamation plant.	2 656.491	2 521.138	2 593.877	2 215.273	1 714.082	2 019.598	2 851.536
Merweville	Groundwater	118.123	112.654	116.709	110.190	101.731	105.630	87.172
Nelspoort	Groundwater and Sout River	173.157	158.836	167.816	215.657	168.083	134.470	178.669
Murraysburg	Groundwater	Bulk meter readings not yet available						
Total		2 947.772	2 792.628	2 878.402	2 541.120	1 983.884	2 259.698	3 117.377



The table below gives an overview of the quantity of water services provided / water balance for all the distribution systems in Beaufort West 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
			FY2014/15	FY2013/14	FY2012/13	FY2014/15	FY2013/14	FY2012/13
		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	482,114	888,304	1,204,930	1.32	2.43	3.30
7.1 / 7.2.3		Ground water abstracted	2,053,539	1,485,629	1,287,352	5.63	4.07	3.53
7.2.14		Effluent recycled	412,118	418,695	386,120	1.13	1.15	1.06
7.2.4		/less Raw water supplied to others	15,697	19,808	29,427	0.04	0.05	0.08
7.2.5		Sub-Total: Raw Water supplied	2,932,074	2,772,820	2,848,975	8.03	7.60	7.81
	10.2 (g) (i)	BULK WATER SUPPLY						
7.2.6		Volume of water treated	2,768,840	2,586,743	2,650,518	7.59	7.09	7.26
7.2.7	10.2 (a) (ii)	Purchased treated water	0	0	0	0.00	0.00	0.00
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	2,768,840	2,586,743	2,650,518	7.59	7.09	7.26
		WATER CONSUMPTION						
7.2.8.1		Billed Metered:	1,384,253	1,286,602	1,366,275	3.79	3.52	3.74
	10.2 (a) (i)	Domestic	1,052,222	1,054,322	1,078,542	2.88	2.89	2.95
	10.2 (a) (i)	Commercial	181,327	190,736	242,071	0.50	0.52	0.66
	10.2 (a) (i)	Industrial	0	0	0			
	10.2 (a) (i)	Other	150,704	41,544	45,662	0.41	0.11	0.13
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)	Other	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	5,538	5,173	5,301	0.02	0.01	0.01
	10.2 (g) (i)	Sub-Total: Authorized consumption	1,389,791	1,291,775	1,371,576	3.81	3.54	3.76
		UNACCOUNTED FOR WATER						
7.3.1		Raw water bulk loss	163,234	186,077	198,457	0.45	0.51	0.54
7.2.3/7.2.4		Billing losses	5,538	5,173	5,301	0.02	0.01	0.01
7.2.5		Apparent losses	275,810	258,994	255,788	0.76	0.71	0.70
7.2.5.1		Illegal connections	82,743	77,698	76,737	0.23	0.21	0.21
7.2.5.2		Inaccurate meters	124,114	116,547	115,105	0.34	0.32	0.32
7.2.5.3		Data errors	68,952	64,748	63,947	0.19	0.18	0.18
7.2.6		Real losses	1,103,239	1,035,974	1,023,154	3.02	2.84	2.80
	10.2 (g) (ii)	Sub-Total: Unaccounted for water	1,379,049	1,294,968	1,482,700	3.78	3.55	4.06
		WASTEWATER TREATMENT						
7.2.9	10.2 (a) (iii)	Total received at WWTW	1,107,072	1,100,922	972,043	3.03	3.02	2.66
7.2.11		Total discharged	717,952	812,007	795,201	1.97	2.22	2.18
7.2.13		Returned to environment	2,665	0	0	0.01	0.00	0.00
7.2.14		Recycled	715,287	812,007	795,201	1.96	2.22	2.18
	10.2 (a) (iv)	Quantity of water supplied not discharged to WWTW's	282,719	190,853	399,533	0.77	0.52	1.09



Quantity of water used by each user sector:

The figure below gives an overview of Beaufort West's overall water usage per Sector for the various financial years.

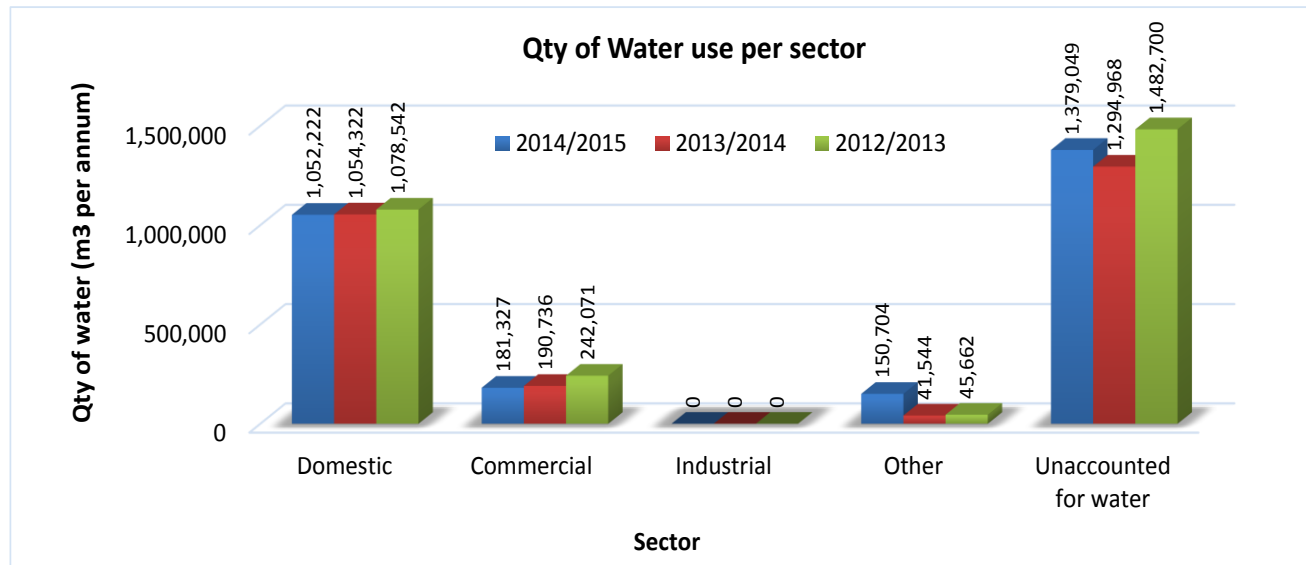


Figure C.1.2: Quantity of water services provided / water balance

Graphs of the water usage per sector for the various distribution systems within Beaufort West 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.

Town	Year	Residential		Business & Industrial		Other		Total Billed Metered Consumption	
		MI/a	MI/d	MI/a	MI/d	MI/a	MI/d	MI/a	MI/d
Beaufort West	08/09	1 407.950	3.857	289.743	0.794	97.959	0.268	1 795.652	4.920
	09/10	959.396	2.628	229.359	0.628	42.003	0.115	1230.758	3.372
	10/11	749.867	2.054	185.068	0.507	20.633	0.057	955.568	2.618
	11/12	862.614	2.363	211.993	0.581	21.185	0.058	1 095.792	3.002
	12/13	974.596	2.670	242.071	0.663	26.290	0.072	1 242.957	3.405
	13/14	968.534	2.654	190.736	0.523	22.558	0.062	1 181.828	3.238
	14/15	960.412	2.631	181.327	0.497	134.357	0.368	1 276.096	3.496
Merweville	08/09	25.155	0.069	0.000	0.000	18.400	0.050	43.555	0.119
	09/10	34.585	0.095	0.000	0.000	16.207	0.044	50.792	0.139
	10/11	54.641	0.150	0.000	0.000	8.720	0.024	63.361	0.174
	11/12	63.689	0.174	0.000	0.000	8.622	0.024	72.311	0.198
	12/13	63.637	0.174	0.000	0.000	11.799	0.032	75.436	0.206
	13/14	48.718	0.133	0.000	0.000	10.575	0.029	59.293	0.162
	14/15	53.958	0.148	0.000	0.000	10.625	0.029	64.583	0.177
Nelspoort	08/09	28.879	0.079	0.000	0.000	72.075	0.197	100.954	0.277
	09/10	37.946	0.104	0.000	0.000	34.288	0.094	72.234	0.198
	10/11	34.127	0.093	0.000	0.000	47.662	0.131	81.789	0.224
	11/12	47.594	0.130	0.000	0.000	14.817	0.041	62.411	0.171
	12/13	40.309	0.110	0.000	0.000	7.573	0.020	47.882	0.131
	13/14	37.070	0.102	0.000	0.000	8.411	0.023	45.481	0.125
	14/15	37.852	0.104	0.000	0.000	5.722	0.016	43.574	0.119
Murraysburg	13/14	Information not yet available							

**Table C.1.3: Quantity of water used by each user sector**

Town	Year	Residential		Business & Industrial		Other		Total Billed Metered Consumption	
		MI/a	MI/d	MI/a	MI/d	MI/a	MI/d	MI/a	MI/d
	14/15	Information not yet available							
TOTAL	08/09	1 461.984	4.005	289.743	0.794	188.434	0.516	1 940.161	5.316
	09/10	1 031.927	2.827	229.359	0.628	92.498	0.253	1 353.784	3.709
	10/11	838.635	2.298	185.068	0.507	77.015	0.211	1 100.718	3.016
	11/12	973.897	2.668	211.993	0.581	44.624	0.122	1 230.514	3.371
	12/13	1 078.542	2.955	242.071	0.663	45.662	0.125	1 366.275	3.743
	13/14	1 054.322	2.889	190.736	0.523	41.544	0.114	1 286.602	3.525
	14/15	1 052.222	2.883	181.327	0.497	150.704	0.413	1 384.253	3.792

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

A five year history of the total influent received at the Beaufort West and Nelspoort WWTW are available. A flow meter for the Merweville WWTW was recently installed and still needs to be calibrated. The historical flow for the Merweville WWTW was therefore calculated as a percentage of the billed metered consumption. The monthly flows at the various WWTWs are also summarised in Annexure A.

Table C.1.4: Quantity of effluent received at the various WWTWs

WWTW	% of Historic Water Demands	14/15	Record : Prior (MI/a)			
			13/14	12/13	11/12	10/11
Beaufort West	N/A - Metered	1 019.697	1 020.566	884.445	847.991	615.157
Merweville	40%	25.833	23.717	30.174	28.924	25.344
Nelspoort	N/A - Metered	61.542	56.639	57.424	66.843 ⁽²⁾	66.762 ⁽¹⁾
Murraysburg	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Total		1 107.072	1 100.922	972.043	943.758	707.263

Notes: (1) Estimated from the average increase in flow over the past 3 years.

(2) Estimated from 6 months flow record data.

Quantity of treated effluent returned to the water resource system:**Table C.1.5: Current effluent re-used practices at the various WWTWs**

WWTWs	Current effluent re-used practices	Year	Volume effluent returned to the WR System (MI/a)	% of Inflow returned to the WR System
Beaufort West	Reclamation Plant and the irrigation of the golf course and sport fields	07/08	710.585	62.5%
		08/09	636.793	59.6%
		09/10	474.894	63.0%
		10/11	239.211	38.9%
		11/12	0	0%
		12/13	0	0%
		13/14	0	0%
		14/15	2.665	0.3%
Merweville	Evaporation – No re-use of treated effluent	Last five years	0	0%
Nelspoort	Evaporation – No re-use of treated effluent		0	0%
Murraysburg	Evaporation – No re-use of treated effluent		0	0%



Requirements for the discharge of industrial effluent, as included in Beaufort West Municipality's By-law relating to Wastewater, are as follows:

- No person may, except with the written consent of the engineer, and subject to such conditions the engineer may determine-
- discharge or permit the discharge of industrial effluent directly or indirectly into any wastewater system;
- increase, or permit to be increased, the quantity or vary, or permit to be varied, the nature, content or composition of any industrial effluent in contravention of the approval granted by the engineer, or
- contravene, or permit to be contravened, any other condition imposed by the engineer when consent was granted to discharge industrial effluent.
- The engineer may if valid reasons exist, revoke any approval granted or amend the conditions under which wastewater may be discharged.



C.2. Water Services Delivery Profile

C.2.1. User Connection Profile

The total number of user connections in each user sector, for the consumers provided with water services by Beaufort West Municipality, is as follows (June 2015):

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

WSDP Ref. #	Category of users	Water Services							
		Year 0 FY2014/15		Year -1 FY2013/14		Year - 2 FY2012/13		New Connections 2014/15	
		Nr	%	Nr	%	Nr	%	Nr	
	<u>RESIDENTIAL (DOMESTIC)</u>								
3.3	Metered: Uncontrolled	11,376	97%	11,141	96%	10,632	96%	235	
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0	
	Unmetered (flat rate)	0	0%	0	0%	0	0%	0	
	Communal water supply	31	0%	31	0%	31	0%	0	
	Sub-Total: Residential	11,407	97%	11,172	97%	10,663	97%	235	
	<u>EDUCATION</u>								
3.3	Schools	21	0%	21	0%	21	0%	0	
	Tertiary educaton facilities	2	0%	2	0%	2	0%	0	
	Sub-Total: Education	23	0%	23	0%	23	0%	0	
	<u>HEALTH</u>								
3.3	Clinics	7	0%	7	0%	7	0%	0	
3.3	Hospitals	2	0%	2	0%	2	0%	0	
3.3	Health Centres	4	0%	4	0%	4	0%	0	
	Sub-Total: Health	13	0%	13	0%	13	0%	0	
	<u>INSTITUTIONAL</u>								
	Public Institutions (Estimated)	15	0%	15	0%	15	0%	0	
3.3	Magistrate Offices	2	0%	2	0%	2	0%	0	
3.3	Police Stations	7	0%	7	0%	7	0%	0	
3.3	Prisons	0	0%	0	0%	0	0%	0	
	etc	0	0%	0	0%	0	0%	0	
	Sub-Total: Institutional	24	0%	24	0%	24	0%	0	
	<u>INDUSTRIAL</u>								
3.3	Dry industries (Incl. with businesses)	0	0%	0	0%	0	0%	0	
3.3	Wet industries	3	0%	3	0%	3	0%	0	
	Sub-Total: Commercial	3	0%	3	0%	3	0%	0	
	<u>COMMERCIAL</u>								
3.3	Businesses	302	3%	302	3%	302	3%	0	
3.3	Office Buildings (Incl. with businesses)	0	0%	0	0%	0	0%	0	
	Sub-Total: Commercial	302	3%	302	3%	302	3%	0	
	<u>MINING</u>								
		0	0%	0	0%	0	0%	0	
	Sub-Total: Commercial	0	0%	0	0%	0	0%	0	
	<u>OTHER</u>								
	Agriculture: raw water	0	0%	0	0%	0	0%	0	
	etc	12	0%	12	0%	12	0%	0	
	Sub-Total: Other	12	0%	12	0%	12	0%	0	
	TOTAL	11,784	100%	11,549	100%	11,040	100%	235	

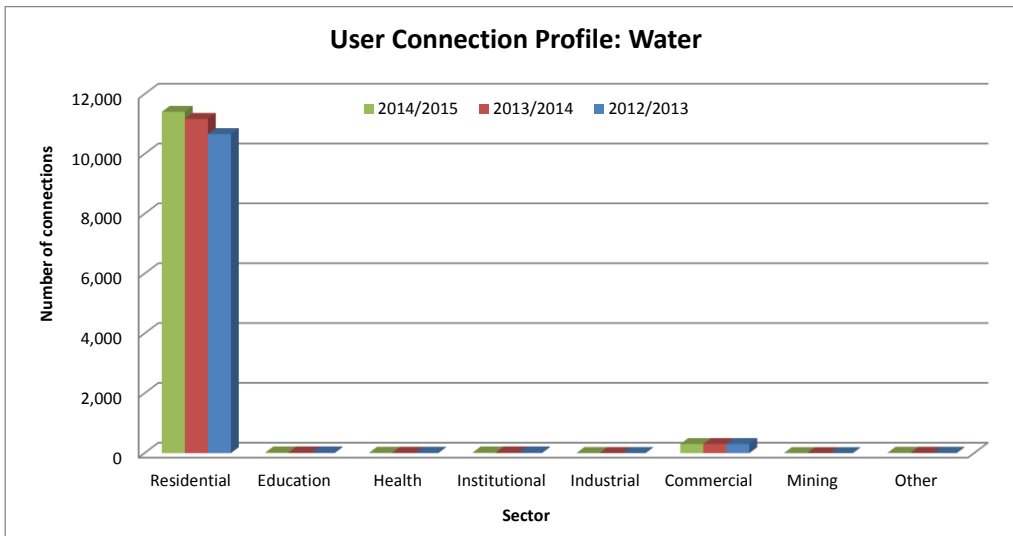


Figure C.2.1.1: User connection profile for water

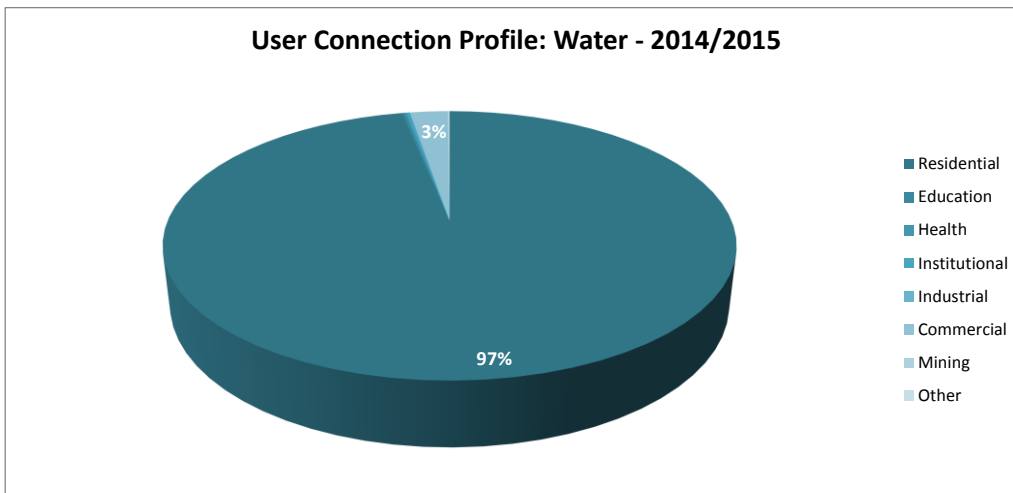


Figure C.2.1.2: User connection distribution for water – Year 2014/2015

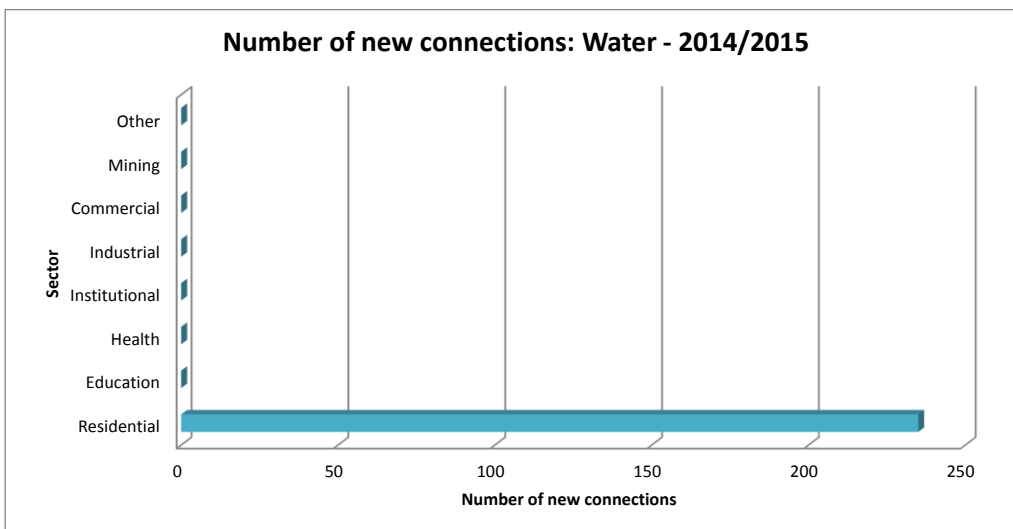


Figure C.2.1.3: Number of new water connections provided during 2014/2015



The total number of user connections in each user sector, for the consumers provided with sanitation services by Beaufort West Municipality, is as follows (June 2015):

Table C.2.1.2: User Connection Profile (Wastewater Services)									
WSDP Ref. #	Category of users	Wastewater Services							
		Year 0 FY2014/15		Year -1 FY2013/14		Year - 2 FY2012/13		New Connections 2014/15	
		Nr	%	Nr	%	Nr	%	Nr	
	RESIDENTIAL (DOMESTIC)								
3.3	Metered: Uncontrolled	11,376	97%	11,141	96%	10,632	96%	235	
3.3	Metered: Controlled	0	0%	0	0%	0	0%	0	
	Unmetered (flat rate)	0	0%	0	0%	0	0%	0	
	Communal water supply	31	0%	31	0%	31	0%	0	
	Sub-Total: Residential	11,407	97%	11,172	97%	10,663	97%	235	
	EDUCATION								
3.3	Schools	21	0%	21	0%	21	0%	0	
	Tertiary educaton facilities	2	0%	2	0%	2	0%	0	
	Sub-Total: Education	23	0%	23	0%	23	0%	0	
	HEALTH								
3.3	Clinics	7	0%	7	0%	7	0%	0	
3.3	Hospitals	2	0%	2	0%	2	0%	0	
3.3	Health Centres	4	0%	4	0%	4	0%	0	
	Sub-Total: Health	13	0%	13	0%	13	0%	0	
	INSTITUTIONAL								
	Public Institutions (Estimated)	15	0%	15	0%	15	0%	0	
3.3	Magistrate Offices	2	0%	2	0%	2	0%	0	
3.3	Police Stations	7	0%	7	0%	7	0%	0	
3.3	Prisons	0	0%	0	0%	0	0%	0	
	etc	0	0%	0	0%	0	0%	0	
	Sub-Total: Institutional	24	0%	24	0%	24	0%	0	
	INDUSTRIAL								
3.3	Dry industries (Incl. with businesses)	0	0%	0	0%	0	0%	0	
3.3	Wet industries	3	0%	3	0%	3	0%	0	
	Sub-Total: Commercial	3	0%	3	0%	3	0%	0	
	COMMERCIAL								
3.3	Businesses	302	3%	302	3%	302	3%	0	
3.3	Office Buildings (Incl. with businesses)	0	0%	0	0%	0	0%	0	
	Sub-Total: Commercial	302	3%	302	3%	302	3%	0	
	MINING								
		0	0%	0	0%	0	0%	0	
	Sub-Total: Commercial	0	0%	0	0%	0	0%	0	
	OTHER								
	Agriculture: raw water	0	0%	0	0%	0	0%	0	
	etc	12	0%	12	0%	12	0%	0	
	Sub-Total: Other	12	0%	12	0%	12	0%	0	
	TOTAL	11,784	100%	11,549	100%	11,040	100%	235	

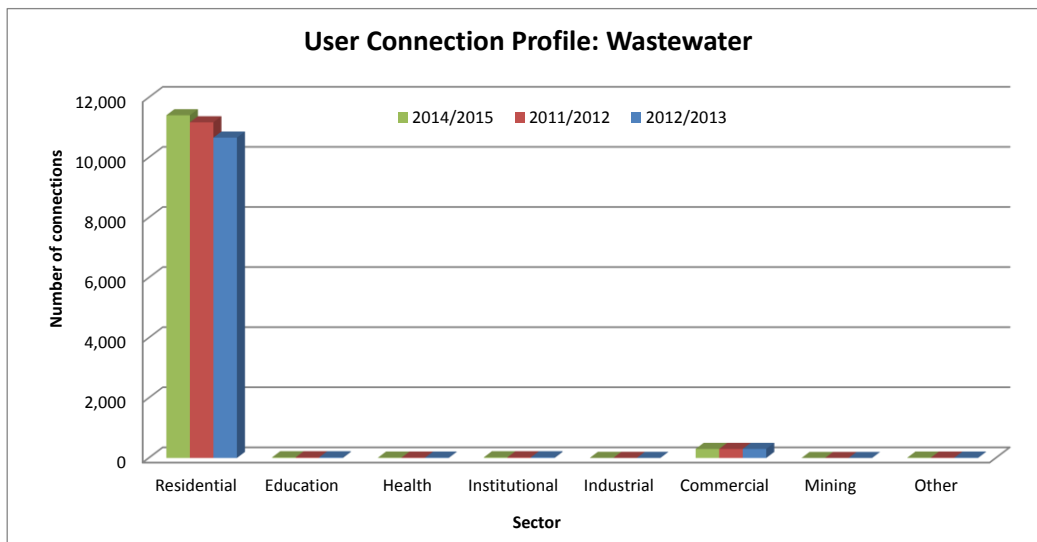


Figure C.2.1.4: User connection profile for wastewater

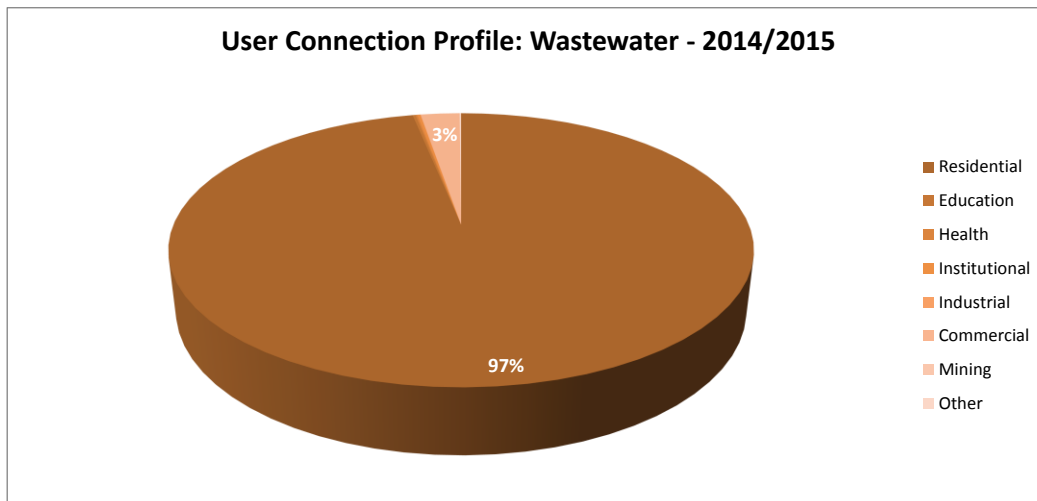


Figure C.2.1.5: User connection distribution for wastewater – Year 2014/2015

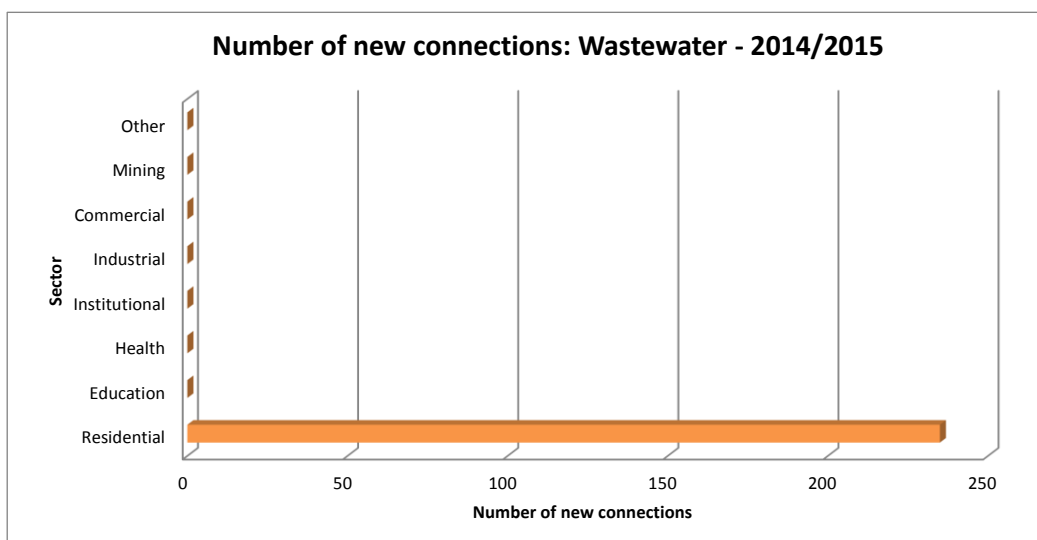


Figure C.2.1.6: Number of new wastewater connections provided during 2014/2015



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

Table C.2.1.3: Number of user connections in each user sector served by Beaufort West Municipality

Town	Projected Population for 2014/2015	No of Residential Consumer Units	No of dry Industrial / Commercial Consumer Units	No of Wet Industrial Consumer Units	No. other Units	Total
Beaufort West	35 642	9 123	291	3	51	9 468
Merweville	1 665	438	3	0	17	458
Nelspoort	1 750	369	4	0	0	373
Murraysburg	5 301	1 446	4	0	4	1 454
Farms	7 249	0	0	0	0	0
TOTALS	51 606	11 376	302	3	72	11 753

All the households in the urban areas of Beaufort West Municipality's Management Area are provided with water connections inside the houses. Informal areas are supplied with shared services as an intermediary measure. Beaufort West Municipality is committed to support the private landowners as far as possible in order to ensure that the households with existing water and sanitation services still below RDP standard are provided with at least basic services. To adequately monitor the provision of basic water and sanitation services on privately owned land is however a big challenge for the Municipality.

C.2.2. Residential Water Services Delivery Access Profile

The table below gives an overview of the water services delivery access profile of Beaufort West Municipality.

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

Census Category	Description	Year 0 FY2014/15		Year -1 FY2013/14		Year -2 FY2012/13	
		Nr	%	Nr	%	Nr	%
	WATER (ABOVE MIN LEVEL)						
Piped (tap) water inside dwelling/institution	House connections	12,745	93%	12,500	92%	11,981	89%
Piped (tap) water inside yard	Yard connections	875	6%	960	7%	1,323	10%
Piped (tap) water on community stand: distance less than 200m from dwelling/institution	Standpipe connection < 200 m	75	1%	75	1%	75	1%
	Sub-Total: Minimum Service Level and Above	13,695	100%	13,535	100%	13,379	100%
	WATER (BELOW MIN LEVEL)						
Piped (tap) water on community stand: distance between 200m and 500m from dwelling/institution	Standpipe connection: > 200 m < 500 m	25	0%	25	0%	25	0%
Piped (tap) water on community stand: distance between 500m and 1000m (1km) from dwelling /institution	Standpipe connection: > 500 m < 1 000 m	4	0%	4	0%	4	0%
Piped (tap) water on community stand: distance greater than 1000m (1km) from dwelling/institution	Standpipe connection: > 1 000 m	0	0%	0	0%	0	0%
No access to piped (tap) water	No services	34	0%	34	0%	34	0%
	Sub-Total: Below Minimum Service Level	63	0%	63	0%	63	0%
	Total number of households	13,758	100%	13,598	100%	13,442	100%

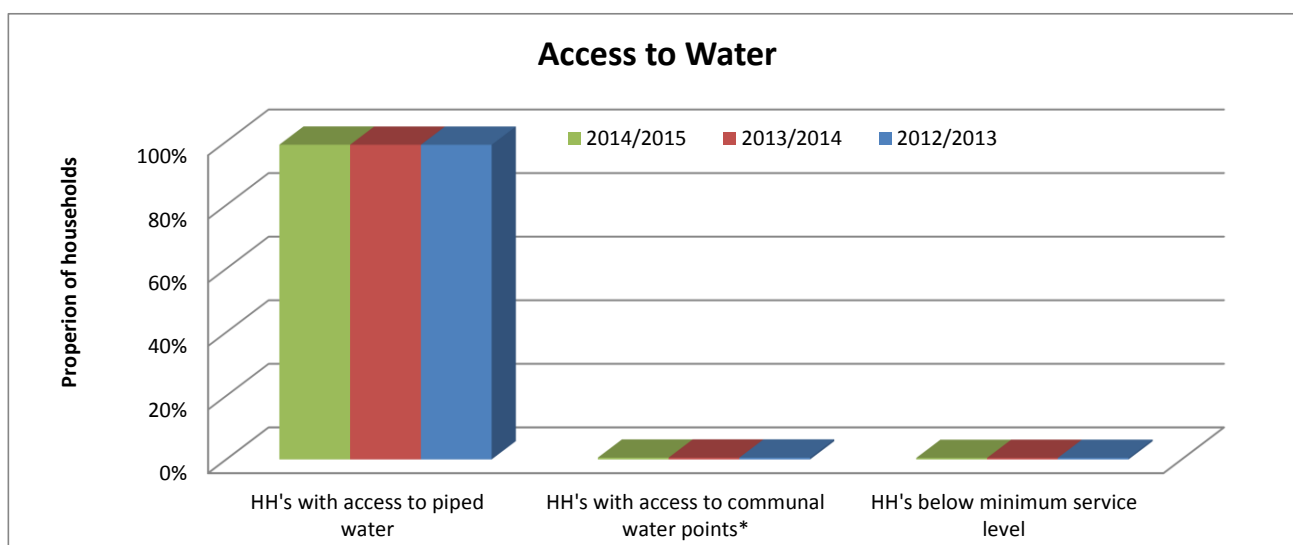


Figure C.2.2.1: Household water access profile

The existing residential water service levels for the various towns in Beaufort West Municipality's Management Area are estimated as follows (June 2015):

Table C.2.2.2: Residential water service levels (Consumers)						
Service Level	Beaufort West	Merweville	Nelspoort	Murraysburg	Farms	Total
No Water Services	0	0	0	0	34 ³⁾	34
Below RDP: Infrastructure Upgrade	0	0	0	0	0	0
Below RDP: Infrastructure Extension	0	0	0	0	29 ⁴⁾	29
Below RDP: Infrastructure Refurbishment	0	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0	0
Total Basic Need (RDP)	0	0	0	0	63	63
Below Housing Interim ⁵⁾	0	0	0	0	0	0
Adequate Housing Permanent ⁶⁾	15	10	0	6	0	31
Total Housing Need	15	10	0	6	0	31
Standpipes	0	0	0	0	44	44
Yard Connections ⁷⁾	150	17	51	0	657	875
House Connections	9 123 ²⁾	438 ²⁾	369 ²⁾	1 446 ²⁾	1 369	12 745
Total Adequate	9 273	455	420	1 446	2 070	13 664
Total	9 288	465	420	1 452	2 133	13 758

Notes: 1) There are no households in the urban areas with existing water service levels below RDP standard.

2) Beaufort West, Nelspoort, Merweville and Murraysburg: Number of residential consumer units for 2014/2015, as indicated by the Municipality.

3) Census 2011: Number of households with no access to piped (tap) water 34

4) Census 2011: Number of households with communal services (200m – 500m) 25, (500m – 1000m) 4 and (>1000m) 0.

5) Below Housing Interim in the above table is the number of shacks in informal areas without basic water services. There are no such areas in Beaufort West Municipality's Management Area.

6) Adequate Housing Permanent in the above table is the number of shacks in informal areas with communal water services. Number of households with communal services in informal areas was confirmed by the Municipality.



- 7) Estimated number of backyard dwellers on formal erven in the urban areas, which was calculated from the 2014/2015 projected number of households.

The table below gives an overview of the sanitation services delivery access profile of Beaufort West Municipality.

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

Census Category	Description	Year 0 FY2014/15		Year -1 FY2013/14		Year - 2 FY2012/13	
		Nr	%	Nr	%	Nr	%
	SANITATION (ABOVE MIN LEVEL)						
Flush toilet (connected to sewerage system)	Waterborne	11,515	84%	11,366	84%	11,220	83%
	Waterborne: Low Flush	0	0%	0	0%	0	0%
Flush toilet (with septic tank)	Septic tanks / Conservancy	1,373	10%	1,362	10%	1,352	10%
Chemical toilet		44	0%	44	0%	44	0%
Pit toilet with ventilation (VIP)	Non-waterborne (above min. service level)	350	3%	350	3%	350	3%
Other		0	0%	0	0%	0	0%
	Sub-Total: Minimum Service Level and Above	13,282	97%	13,122	96%	12,966	96%
	SANITATION (BELOW MIN LEVEL)						
Pit toilet without ventilation	Pit toilet	125	1%	125	1%	125	1%
Bucket toilet	Bucket toilet	56	0%	56	0%	56	0%
Other toilet provision (below min. service level)	Other	20	0%	20	0%	20	0%
No toilet provisions	No services	275	2%	275	2%	275	2%
	Sub-Total: Below Minimum Service Level	476	3%	476	4%	476	4%
	Total number of households	13,758	100%	13,598	100%	13,442	100%

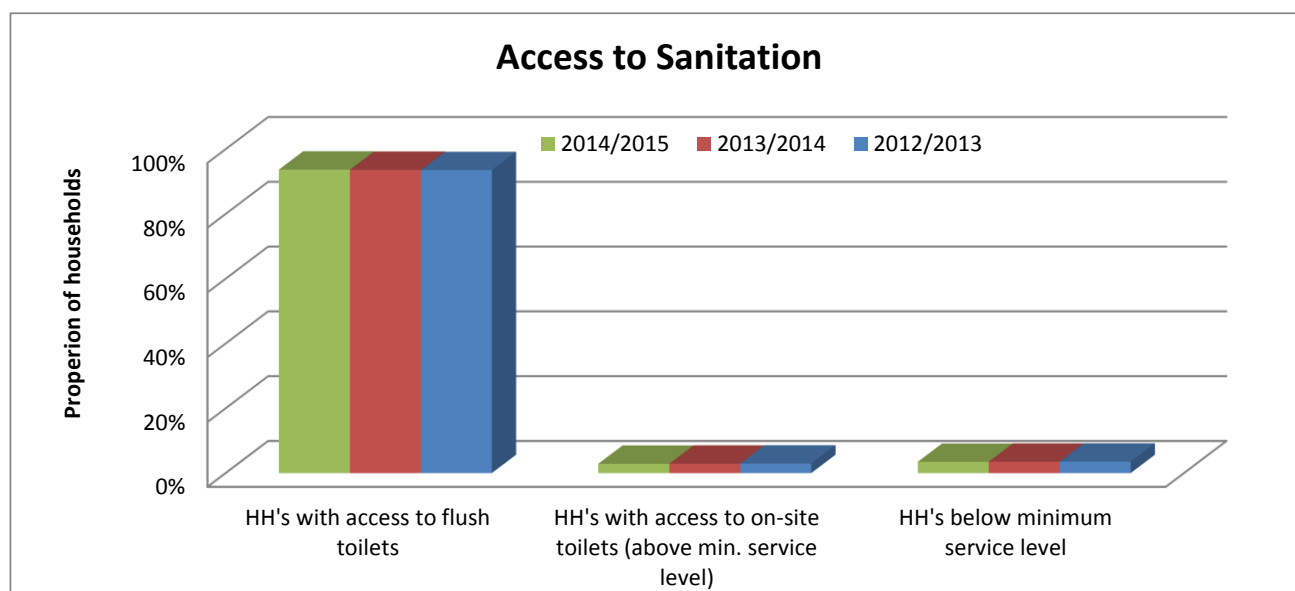


Figure C.2.2.2: Household sanitation access profile



The existing residential sanitation service levels for the various towns in Beaufort West Municipality's Management Area are estimated as follows (June 2015):

Table C.2.2.4: Residential sanitation service levels (Consumers)						
Service Levels	Beaufort West	Merweville	Nelspoort	Murraysburg	Farms	Total
No Sanitation Services	0	0	0	0	275 ²⁾	275
Below RDP: Infrastructure Upgrade	0	0	0	0	245 ³⁾	245
Below RDP: Infrastructure Extension	0	0	0	0	0	0
Below RDP: Infrastructure Refurbishment	0	0	0	0	0	0
Below RDP: O&M Needs	0	0	0	0	0	0
Below RDP: Water Resource Needs	0	0	0	0	0	0
Below RDP: Infrastructure and O&M Needs	0	0	0	0	0	0
Below RDP: Infrastructure, O&M and Water Resource Needs	0	0	0	0	0	0
Total Basic Need (RDP)	0	0	0	0	520	520
Below Housing Interim ⁵⁾	0	0	0	0	0	0
Adequate Housing Permanent ⁶⁾	15	10	0	6	0	31
Total Housing Need	15	10	0	6	0	31
None Waterborne	0	0	0	0	350 ⁴⁾	350
Waterborne Low Flush	0	0	0	0	0	0
Septic Tanks / Conservancy	0	85	0	25	1 263	1 373
Waterborne WWTW ¹⁾	9 273	370	420	1 421	0	11 484
Total Adequate	9 273	455	420	1 446	1 613	13 207
Total	9 288	465	420	1 452	2 133	13 758

Notes: 1) Include Backyard dwellers

2) Census 2011: Number of households with no toilet facility 275.

3) Census 2011: Number of households with existing buckets 56, chemical toilets 44, pit toilets without ventilation 125 and "other" 20.

4) Census 2011: Number of households with pit toilets with ventilation 350.

5) Below Housing Interim in the above table is the number of shacks in informal areas without basic sanitation services. There are no such areas in Beaufort West Municipality's Management Area.

6) Adequate Housing Permanent in the above table is the number of shacks in informal areas with communal ablution facilities. Number of households with communal services in informal areas was confirmed by the Municipality.

Number of households provided with water through communal water services:

It is estimated that 15 households in Beaufort West, 10 households in Merweville and 6 households in Murraysburg are still serviced through communal water services.

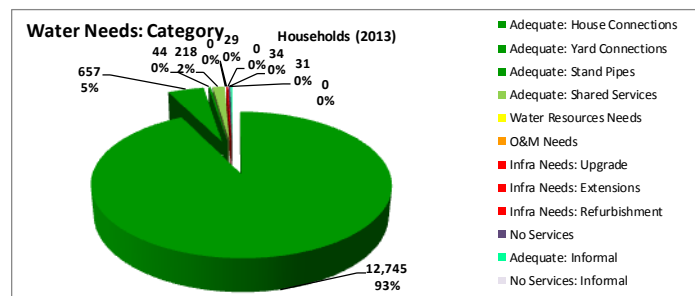
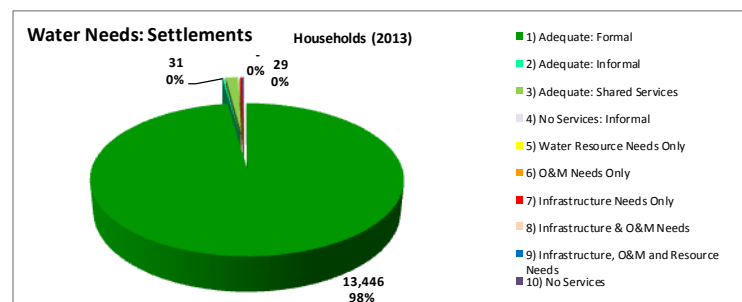


C.2.3. Residential Water Services Delivery Adequacy Profile

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

Table C.2.3.1: Residential Water Services Delivery 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	%				
1	37	12,745	100%	657	100%	44	100%																				
2	3																							31	100%		
3	10							218	100%																		
4	0																										
5	0																										
6	0																										
7	3															29	100%										
8	0																										
9	0																										
10	3																						34	100%			
Total Household Interventions required		12,745		657		44		218		0		0		0		29		0		0		34		31		0	

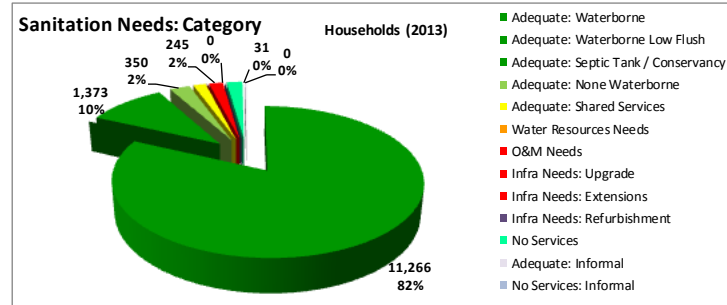
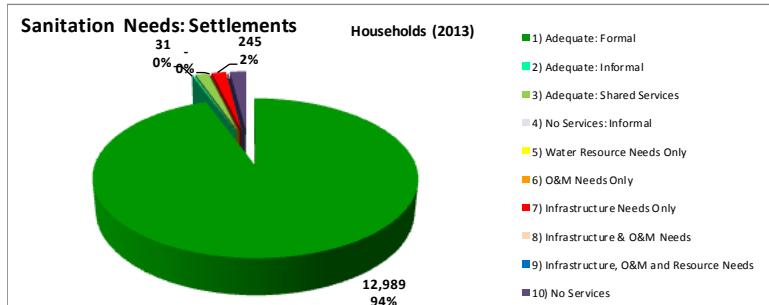


1	Adequate	3	Adequate: Shared services	5	Water Resources Needs <u>Only</u>	7	Infrastructure Needs <u>Only</u>	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs <u>Only</u>	8	Infrastructure & O&M needs	10	No Services



The existing residential sanitation service levels in Beaufort West 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						No services		Adequate		No services		
		Waterborne		Waterborne Low flush		Septic Tank/ Conservancy		None Waterborne		Shared Services						Upgrades		Extensions		Refurbishment								
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	
1	37	11,266	100%			1,373	100%	350	100%																			
2	3																								31	100%		
3	10									218	100%																	
4	0																											
5	0																											
6	0																											
7	3															245	100%											
8	0																											
9	0																											
10	3																					275	100%					
Total Household Interventions required		11,266		0		1,373		350		218		0		0		245		0		0		275		31		0		



1	Adequate	3	Adequate: Shared services	5	Water Resources Needs <u>Only</u>	7	Infrastructure Needs <u>Only</u>	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O & M Needs <u>Only</u>	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 Beaufort West Municipality for the 2014/2015 financial year and the previous three financial years are summarised in the table below (Subject to 14% VAT).

Table C.3.1.1: Water tariff structures for Beaufort West Municipality						
Town	Consumer/Description	Block Definition	14/15	13/14	12/13	11/12
Beaufort West	Basic Charge per month	Residential & Industrial	R108-50	R104-40	R93-00	R68-90
		Sub-economical houses	R66-25	R61-90	R56-82	R53-10
		Communal services (Standpipe)	R46-45	R43-40	R39-82	R29-50
Merweville	Basic Charge per month	All credit meters	R17-50	R16-40	R15-05	R14-07
Nelspoort	Basic Charge per month	All credit meters	R60-00	R56-05	R51-43	R48-07
Murraysburg	Basic Charge per month	All credit meters	R29-10	R27-20	R24-93	R23-30
All areas	Indigent Households	0 – 6 Kl	R0-00	R0-00	R0-00	R0-00
Beaufort West	Credit Meters	0 – 6 Kl	R9-55	R8-93	R8-20	R6-08
		7 – 20 Kl	R10-95	R10-23	R9-39	R6-96
		21 – 50 Kl	R11-90	R11-13	R10-31	R7-64
		> 50 Kl	R13-05	R12-18	R11-17	R8-28
	Pre-paid Meters	0 – 6 Kl	R15-10	R14-12	R12-95	R9-60
		7 – 10 Kl	R17-25	R16-13	R14-80	R10-97
		> 10 Kl	R21-30	R19-93	R18-29	R13-55
Merweville	Credit Meters	Per Kl	R5-10	R4-75	R6-87	R4-36
	Pre-paid Meters	Per Kl	R8-00	R7-50	R4-54	R6-42
Nelspoort	Credit Meters	0 – 6 Kl	R5-30	R4-95	R5-19	R4-24
		7 – 20 Kl	R6-05	R5-65	R5-70	R4-85
		21 – 50 Kl	R6-60	R6-20	R6-17	R5-33
		> 50 Kl	R7-20	R6-73	R7-17	R5-77
	Pre-paid Meters	0 – 6 Kl	R8-35	R7-82	R8-20	R6-70
		7 – 10 Kl	R9-60	R8-94	R10-10	R7-66
		> 10 Kl	R11-80	R11-00	R6-87	R9-45
Murraysburg	Credit Meters	Per Kl	R3-45	R3-20	R3-00	R2-81
	Pre-paid Meters	Per Kl	R5-60	R5-25	R4-82	R4-50
Droughts (Phase 1)	Credit Meters	0 – 6 Kl	R9-55	R8-93	R8-20	R6-08
		7 – 15 Kl	R10-95	R10-23	R9-39	R6-96
		16 – 25 Kl	R16-43	R15-35	R14-08	R10-44
		26 – 50 Kl	R21-90	R20-46	R18-78	R13-92
		> 50 Kl	R31-21	R29-16	R26-76	R19-84
	Pre-paid Meters	0 – 6 Kl	R15-10	R14-12	R12-95	R9-60
		7 – 15 Kl	R17-25	R16-13	R14-8	R10-97
		> 15 Kl	R25-88	R24-20	R22-20	R16-46
Droughts (Phase 2)	Credit Meters	0 – 6 Kl	R9-55	R8-93	R8-20	R6-08
		7 – 10 Kl	R10-95	R10-23	R9-39	R6-96
		11 – 15 Kl	R16-43	R15-35	R14-08	R10-44
		16 – 20 Kl	R21-90	R20-46	R18-78	R13-92
		21 – 30 Kl	R31-21	R29-16	R26-76	R19-84
		> 30 Kl	R38-33	R35-81	R32-86	R24-36
	Pre-paid Meters	0 – 6 Kl	R15-10	R14-12	R12-95	R9-60
		7 – 10 Kl	R17-25	R16-13	R14-80	R10-97



Table C.3.1.1: Water tariff structures for Beaufort West Municipality						
Town	Consumer/Description	Block Definition	14/15	13/14	12/13	11/12
		11 – 15 Kl	R25-88	R24-20	R22.20	R16-46
		> 15 Kl	R34-50	R32-26	R29-60	R21-94
Droughts (Phase 3)	Credit Meters	0 – 6 Kl	R9-88	R8-93	R8-20	R6-08
		7 – 10 Kl	R10-95	R10-23	R9-39	R6-96
		11 – 15 Kl	R21-90	R20-46	R18-78	R13-92
		16 – 20 Kl	R32-85	R30-69	R28-17	R20-88
		21 – 30 Kl	R38-33	R35-81	R32-86	R24-36
		> 30 Kl	R49-28	R46-04	R42-25	R31-32
	Pre-paid Meters	0 – 6 Kl	R15-10	R14-12	R12-95	R9-60
		7 – 10 Kl	R17-25	R16-13	R14-80	R10-97
		11 – 15 Kl	R25-88	R24-20	R22.20	R16-46
		> 15 Kl	R34-50	R32-26	R29-60	R21-94
Beaufort West Businesses	Normal	Per Kl	R11-90	R11-13	R10-31	R7-64
	Droughts (Phase 1)	Per Kl	R11-90	R11-13	R10-31	R7-64
	Droughts (Phase 2)	Per Kl	R17-85	R13-40	R12-30	R9-12
	Droughts (Phase 3)	Per Kl	R23-80	R20-46	R18-78	R13-92
Beaufort West	Transnet	Per Kl	R11-90	R11-13	R10-31	R7-64
Connect and disconnect of water		Per Case	R60-00	R57-25	R53-50	R50-00
Re-connection of meters		Per Case	R65-00	R62-00	R58-00	R53-00
Re-connection of meters (Murraysburg)		Per Case	R26-75	R25-00	R23-00	R21-50
Testing of meters		Per Meter	R100-00	R96-00	R90-00	R85-00
Availability Fee		Per Month Per Plot	R108-50	R104-40	R93-00	R68-90
Connection up to 20mm dia. with 15mm meter			R2 450-00	R2 322-00	R2 170	R2 030
Connection larger than 20mm dia			Actual cost + applicable admin fee			
New water connection (Murraysburg)			Actual Cost + 10%	Actual Cost + 10%	Actual Cost + 10%	Actual Cost + 10%
Deposit Credit Meters Murraysburg			R33-00	R30-90	R28-35	R26-50

The sewerage tariff structures for Beaufort West Municipality for the 2014/2015 financial year and the previous three financial years are summarised in the table below (Subject to 14% VAT).

Table C.3.1.2: Sewerage tariff structures for Beaufort West Municipality						
Town	Consumer/Description	Block Definition	14/15	13/14	12/13	11/12
Beaufort West	Intermediate or full waterborne	Residential, Schools, Hostels, Old Age Homes, Churches, Mun. Buildings, etc. - Per toilet or urinal	R82-40	R77-00	R70-65	R66-05
		Sub Economic houses	R22-80	R21-30	R19-55	R18-25
Merweville		All	R69-55	R65-00	R59-70	R55-80
Nelspoort		All	R34-90	R32-60	R29-90	R27-95
Murraysburg		Schools	R63-55	R59-40	R54-50	-
		All other Basic Fee	R40-00	R37-00	R34-00	-
Beaufort West	Plots with buildings on not connected to sewer system		R82-40	R77-00	R70-65	R66-05
Merweville	Plots with buildings on not connected to sewer system		R10-15	R9-50	R8-69	R8-13
Beaufort West	Septic Tanks - Cost of tank emptying per load	Office Hours	R185-00	R173-00	R159-00	R149-00
		After Hours	R660-00	R620-00	R568-00	R530-00
Merweville	Septic Tanks - Cost of tank emptying per load	Office Hours	R122-00	R114-00	R104-50	R97-50
		After Hours	R244-00	R228-00	R209-00	R195-00
Murraysburg	Septic Tanks - Cost of tank emptying per load	Office Hours	R40-00	R37-00	R34-00	-
		After Hours	R66-00	R61-80	R56-70	-
All	Businesses		R106-15	R99-20	R91-00	R85-05



C.3.2. Metering, Billing and Free Basic Services

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

Table C.3.2.1: Overview of Metering, Billing and Free Basic Services					
Regulation s Ref. #	Description	Unit	Year 0	Year - 1	Year - 2
			FY2014/15	FY2013/14	FY2012/13
	UNITS SUPPLIED (as per water services access profile)				
10.2 (b) (i)	Household water connections (house and yard connections)	Nr	13 620	13 460	13 304
10.2 (b) (iv)	Household sewerage connections	Nr	12 888	12 728	12 572
	METERING				
	Metered Water Connections (aligned with Table C2.1)				
	Residential	Nr	11 407	11 172	10 663
	Commercial / Business	Nr	302	302	302
	Industrial	Nr	3	3	3
	Government / Institutional	Nr	60	60	60
	etc.	Nr	12	12	12
	Sub-Total: Metered Water Connections	Nr	11 784	11 549	11 040
	Proportion of metered connections (residential) *	%	84%	83%	80%
	Total number of meters	Nr	11 784	11 549	11 040
10.2 (b) (vi)	Total number of new connections (aligned with Table C.2.1)	Nr	509	509	46
10.2 (e) (i)	Total number of new meters installed	Nr	509	509	46
	Proportion of new connections, metered	%	100%	100%	100%
	Number of meters tested	Nr	225	163	71
10.2 (e) (ii)	Proportion of meters tested to total number of meters	%	2%	1%	1%
	Number of meters replaced	Nr	339	387	82
10.2 (e) (ii)	Proportion of meters replaced to total number of meters	%	2.9%	3.4%	0.7%
	BILLING				
	Customer billing (water and sewerage)		Nr	Nr	Nr
	Residential	Nr	11 407	11 172	10 663
	Commercial / Business	Nr	302	302	302
	Industrial	Nr	3	3	3
	Government / Institutional	Nr	60	60	60
	etc.	Nr	12	12	12
	Sub-Total: Customers billed	Nr	11 784	11 549	11 040
	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	5 790	2 898	2 661
10.2 (b) (v)	Free Basic Sanitation	Nr	2 890	2 898	2 661
	Proportion of Free Basic Services				
	Water	%	100%	100%	100%
	Sewerage	%	25%	26%	25%

Note: * The detail residential water meter audit completed for Beaufort West by the Municipality indicated that approximately 3.7% of the residential consumer connections are not metered (Meters removed, meters unreadable, meters not reachable). The "Water Services Access Profile" however includes the consumers on the farms and the backyard dwellers on formal erven in the urban areas, therefore the difference of 80% - 85% between the residential metered water connections and the household water connections figures in the above table. 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.



The Municipality further completed their own detail Water Meter Audit during 2012/2013 for Beaufort West, in order to identify the reason for the high NRW. The results from the audit are summarised in the table below for Beaufort West:

Table C.3.2.2: Detail Water Meter Audit for Beaufort West (2012/2013)				
Description	Credit Water Meters		Prepaid Water Meters	
	Number	%	Number	%
Meters in good condition	4 812	96.9%	2 475	88.1%
Faulty Meters	156	3.1%	334	11.9%
Total	4 968	100%	2 809	100%
Meters removed			196	
Meters unreadable			13	
Dilapidated houses (No meters)			20	
Meters not reachable			37	
Total			266	

The recommendations from the detail Water Meter Audit were as follows:

- The Water Meter Audit needs to be extended to also include the other areas in Beaufort West Municipality's Management Area (Murraysburg, Merweville and Nelspoort).
- All meters removed or by-passed need to be replaced and repaired. All faulty meters need to be repaired immediately.
- The billing system for indigent supply by pre-paid water meters and billed by journal must be stopped immediately.
- Free water for indigents, with prepaid water meters, needs to be supplied by a token "selling". This will mean that the volume of water will be recorded correct in the Financial System.
- The engineering token must be reprogrammed so that the pre-paid meter can be programmed before free water is sold by the tag, in conjunction with the change in billing system.



The graph below gives an overview of the water meters replaced or repaired by Beaufort West Municipality for the various financial years.

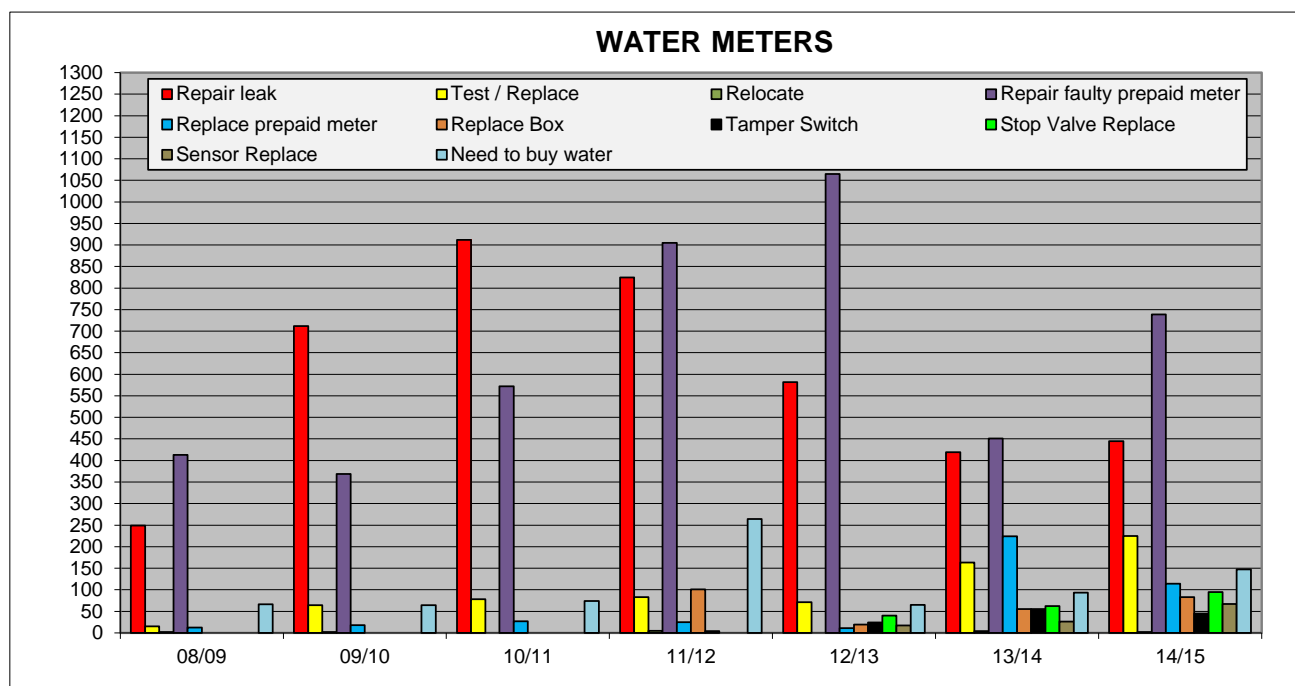


Figure C3.2.1: Water Meters replaced or repaired by Beaufort West Municipality

The main reasons for inaccuracy are incorrect selection, incorrect sizing, incorrect installation, incorrect reading and lack of maintenance. It is important for Beaufort West Municipality to continue with the implementation of their Meter Replacement Programme, whereby all faulty and leaking meters are replace / repaired immediately and all meters older than eight (8) years are replaced systematically, as funding becomes available.



C.3.3. Revenue Collection and Cost Recovery

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

Table C.3.3.1: Overview of Water Services Revenue Collection and Cost Recovery				
Regulation s Ref. #	Description	Year 0	Year - 1	Year - 2
		FY2014/15	FY2013/14	FY2012/13
	INCOME	R'000	R'000	R'000
	Billed			
	Water reticulation / provision	R 18 098	R 14 702	R 9 345
	Sewerage / wastewater	R 23 120	R 15 190	R 15 486
	Sub-Total: Billed	R 41 218	R 29 892	R 24 831
	Collections			
	Water reticulation / provision	R 23 766	R 19 656	R 14 714
	Sewerage / wastewater	R 18 893	R 14 746	R 14 720
	Sub-Total: Collections	R 42 659	R 34 402	R 29 434
	Equitable share income			
	Water reticulation / provision	R 8 035	R 6 899	R 6 648
	Sewerage / wastewater	R 2 743	R 2 158	R 1 832
	Sub-Total: Equitable share income	R 10 778	R 9 057	R 8 480
	EXPENDITURE (O&M)	R'000	R'000	R'000
	Water services	R 22 549	R 20 812	R 21 807
	Sewerage / wastewater services	R 7 672	R 5 932	R 4 906
	Total: Water Services O&M	R 30 220	R 26 744	R 26 713
	COST RECOVERY ANALYSIS / RATIO'S	%	%	%
10.2 (d) (ii)	Billed as % of Cost			
	Water	116%	104%	73%
	Sewerage	337%	292%	353%
	Total	172%	146%	125%
10.2 (d) (iii)	Unrecovered as % of Cost			
	Water services	11%	9%	6%
	Sewerage / wastewater services	91%	44%	53%
	Total	31%	17%	15%

The table below gives a summary of Beaufort West Municipality Operational and Maintenance Expenditure and Income Budgets for water and sanitation services for the last five years. The detail budget is included in Annexure E.

Table C.3.3.2: Summary of Operational and Maintenance Budgets for water and sanitation services					
Description	Actual 14/15	Actual 13/14	Actual 12/13	Actual 11/12	Actual 10/11
Water Services (Admin Water, Irrigation Water, Water Purification, Water Reticulation and Water Murraysburg)					
Expenditure	R22 548 681	R20 811 509	R21 806 909	R19 679 510	R15 115 143
Income	-R26 133 367	-R21 600 276	-R15 993 196	-R12 842 533	-R39 592 872
Surplus / Deficit	-R3 584 686	-R788 767	R5 813 713	R6 836 977	-R24 477 729
Sanitation Services (Sewerage System, Sewerage Farm, Vacuum Services)					
Expenditure	R7 671 591	R5 932 047	R4 905 700	R5 500 523	R3 995 653
Income	-R25 863 515	-R17 348 523	-R17 317 811	-R9 227 059	-R10 503 026
Surplus / Deficit	-R18 191 924	-R11 416 476	-R12 412 111	-R3 726 536	-R6 507 373



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

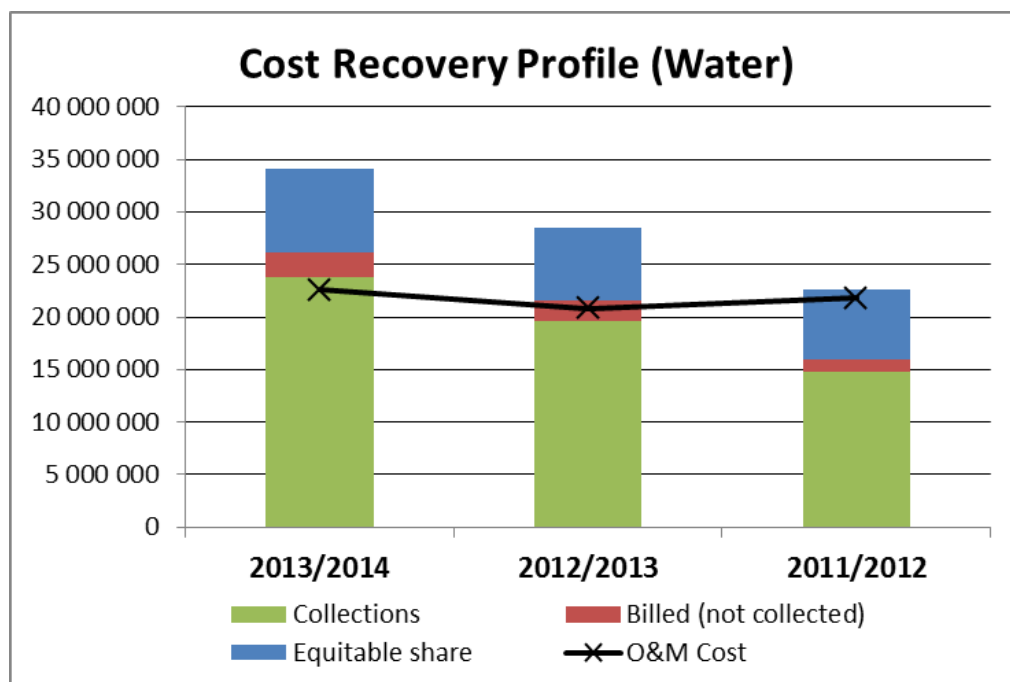


Figure C.3.3.1: Revenue collection and cost recovery profile (Water)

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

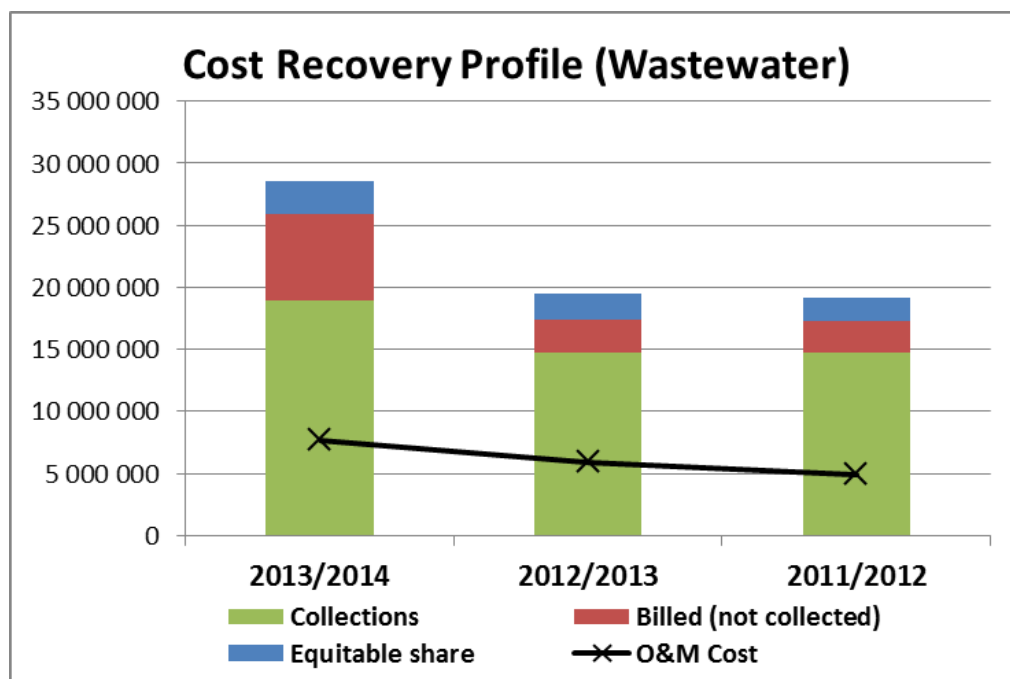


Figure C.3.3.2: Revenue collection and cost recovery profile (Wastewater)



The table below gives an overview of the analysis of the consumer debtors' age in days for the 2014/2015 financial year as on the 30th of June 2015.

Table C.3.3.3: Debtors as on the 30th of June 2015 for the various income sources								
Item	Detail	0-30 Days	31-60 Days	61-90 Days	91-120 Days	Total	Actual Bad Debts Written Off against Debtors	Impairment - Bad Debts i.t.o Council Policy
1100	Debtors Age Analysis By Income Source							
1200	Water	R1 132 324	R629 280	R211 438	R2 818 856	R4 791 898	R0	R234 00
1300	Electricity	R3 997 167	R260 299	R73 817	R1 013 444	R5 344 727	R0	R318 00
1400	Property Rates	R1 419 476	R273 426	R209 244	R4 026 810	R5 928 956	R0	R318 00
1500	Waste Water Management	R953 801	R328 919	R295 757	R7 290 910	R8 869 387	R0	R516 00
1600	Waste Management	R522 909	R225 127	R206 789	R4 987 397	R5 942 222	R0	R360 00
1700	Property Rental Debtors	R5 385	R1 869	R1 329	R72 890	R81 473	R0	R9 000
1810	Interest on arrear debtor accounts	R0	R0	R0	R0	R0	R0	R0
1820	Unauthorised, irregular or fruitless and wasteful Exp.	R0	R0	R0	R0	R0	R0	R0
1900	Other	R7 393 627	R643 222	R1 307 284	R18 904 352	R28 248 485	R0	R1 245 000
2000	Total by Income Source	R15 424 689	R2 362 142	R2 305 658	R39 114 659	R59 207 148	R0	R3 000 000
2100	Debtors Age Analysis By Customer Group							
2200	Organs of state	R708 417	R211 443	R60 319	R746 550	R1 726 729	R0	R0
2300	Commercial	R1 266 274	R393 109	R133 500	R1 241 744	R3 034 627	R0	R0
2400	Households	R12 194 294	R1 667 946	R1 833 047	R32 849 084	R48 544 371	R0	R3 000 000
2500	Other	R1 255 704	R89 644	R278 792	R4 277 281	R5 901 421	R0	R0
2600	Total by Customer Group	R15 424 689	R2 362 142	R2 305 658	R39 114 659	R59 207 148	R0	R3 000 000

C.4. Water Quality

C.4.1. Sampling Programme

The tables below give an overview of the Municipality's compliance sampling programmes for potable water quality for Beaufort West, the Beaufort West Reclamation Plant, Merweville, Nelspoort and Murraysburg.

Table C.4.1.1: Sampling Programme for Potable Water Quality								
Treated Water Schemes: Beaufort West (Monitoring Programme 3)								
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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
WCBWBW-006	Beaufort West WTW	Yes	Yes	Yes	Microbiological (Health)			
WCBWBW-004	Beaufort Mall	Yes	Yes	Yes	E.Coli (Count per 100 ml)	30	30	30
WCBWBW-005	Checkers Square	Yes	Yes	Yes				
WCBWBW-017	Clinic, Nieuveland Park	Yes	Yes	Yes	Aesthetic			
WCBWBW-019	Hillside	Yes	Yes	Yes	Iron as Fe (µg/l)	60	60	60
WCBWBW-013	Hospitaal Heuwel	Yes	Yes	Yes	Manganese as Mn (µg/l)	60	60	60
WCBWBW-008	Industrial Area	Yes	Yes	Yes	Conductivity at 25 °C (mS/m)	60	60	60
WCBWBW-011	Kwa-Mandlenkosi	Yes	Yes	Yes				
WCBWBW-014	Noordeinde	Yes	Yes	Yes	Operational			
WCBWBW-009	Rustdene	Yes	Yes	Yes	Total Coliforms count per 100 ml	30	30	30
WCBWBW-001	Squatter Camp	Yes	Yes	Yes	Aluminium as Al (µg/l)	60	60	60
Erf 6716	Tattieslaan 7	Yes	Yes	Yes	pH at 25°C	60	60	60
	On programme, but not sampled							
	Sampled, but not on programme				Disinfectant Residual			
					Residual Chlorine (mg/l)	60	60	60
					Not in STD / Limit set			
					Turbidity (operational) NTU	30	30	30

**Table C.4.1.1: Sampling Programme for Potable Water Quality****Treated Water Schemes: Beaufort West Reclamation Plant**

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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
Wes Her 1	Herwinningaanleg	Yes	Yes	Yes	Microbiological (Health)			
					E.Coli (Count per 100 ml)	30	30	30
					Chemical (Health)			
					Sulphate as SO ₄ (mg/l)	30	30	30
					Lead as Pb (µg/l)	30	30	30
					Mercury as Hg (µg/l)	30	30	30
					Nickel as Ni (µg/l)	30	30	30
					Selenium as Se (µg/l)	30	30	30
					Vanadium as V (µg/l)	30	30	30
					Dissolved Organic Carbon as C (mg/l)	30	30	30
					Fluoride as F (mg/l)	30	30	30
					Nitrate and Nitrite as N (mg/l)	30	30	30
					Antimony as Sb (µg/l)	30	30	30
					Arsenic as As (µg/l)	30	30	30
					Cadmium as Cd (µg/l)	30	30	30
					Total Chromium as Cr (µg/l)	30	30	30
					Cobalt as Co (µg/l)	30	30	30
					Copper as Cu (µg/l)	30	30	30
					Cyanide (recoverable) as CN ⁻ (µg/l)	30	30	30
					Aesthetic			
					Iron as Fe (µg/l)	30	30	30
					Sodium as Na (mg/l)	30	30	30
					Ammonia as N (mg/l)	30	30	30
					Chloride as Cl ⁻ (mg/l)	30	30	30
					Colour (mg/l) Pt	30	30	30
					Conductivity at 25 °C (mS/m)	30	30	30
					Total Dissolved Solids (mg/l)	30	30	30
					Manganese as Mn (µg/l)	30	30	30
					Zinc as Zn (mg/l)	30	30	30
					Operational			
					Aluminium as Al (µg/l)	30	30	30
					pH at 25°C	30	30	30

Table C.4.1.1: Sampling Programme for Potable Water Quality**Treated Water Schemes: Merweville (Programme 2)**

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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
WCBWMV-004	Merw eville WTW	Yes	Yes	Yes	Microbiological (Health)			
	SAPD	Yes	Yes	Yes	E.Coli (Count per 100 ml)	120	120	120
WCBWMV-007	Daffodillaan 26	Yes	Yes	Yes				
Merw eville 008	Drankw inkel	Yes	Yes	Yes	Aesthetic			
WCBWMV-001	Municipal Offices	Yes	Yes	Yes	Iron as Fe (µg/l)	120	120	120
	On programme, but not sampled				Manganese as Mn (µg/l)	120	120	120
	Sampled, but not on programme				Conductivity at 25 °C (mS/m)	120	120	120
					Operational			
					Total Coliforms count per 100 ml	120	120	120
					Aluminium as Al (µg/l)	120	120	120
					pH at 25°C	120	120	120
					Disinfectant Residual			
					Residual Chlorine (mg/l)	2	2	2
					Not in STD / Limit set			
					Turbidity (operational) NTU	30	30	30

**Table C.4.1.1: Sampling Programme for Potable Water Quality****Treated Water Schemes: Nelspoort**

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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
WCBWNP-005	Nelspoort WTW	Yes	Yes	Yes	Microbiological (Health)			
WCBWNP-002	Nelspoort Clinic	Yes	Yes	Yes	E.Coli (Count per 100 ml)	120	120	120
WCBWNP-001	Nelspoort Creche	Yes	Yes	Yes				
WCBWNP-004	Restvale School	Yes	Yes	Yes	Aesthetic			
WCBWNP-003	SAPD	Yes	Yes	Yes	Iron as Fe(µg/l)	120	120	120
	On programme, but not sampled				Manganese as Mn (µg/l)	120	120	120
	Sampled, but not on programme				Conductivity at 25 °C (mS/m)	120	120	120
					Operational			
					Total Coliforms count per 100 ml	120	120	120
					Aluminium as Al (µg/l)	120	120	120
					pH at 25°C	120	120	120
					Disinfectant Residual			
					Residual Chlorine (mg/l)	3	3	3
					Not in STD / Limit set			
					Turbidity (operational) NTU	30	30	30

Table C.4.1.1: Sampling Programme for Potable Water Quality**Treated Water Schemes: Murraysburg**

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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
Murraysburg 005	Murraysburg South	Yes	Yes	Yes	Microbiological (Health)			
Murraysburg 004	Murraysburg North	Yes	Yes	Yes	E.Coli (Count per 100 ml)	30	30	30
	On programme, but not sampled							
	Sampled, but not on programme				Aesthetic			
					Iron as Fe(µg/l)	30	30	30
					Manganese as Mn (µg/l)	30	30	30
					Conductivity at 25 °C (mS/m)	30	30	30
					Operational			
					Total Coliforms count per 100 ml	30	30	30
					Aluminium as Al (µg/l)	30	30	30
					pH at 25°C	30	30	30
					Disinfectant Residual			
					Free available Chlorine (mg/l)	30	30	30
					Not in STD / Limit set			
					Turbidity (operational) NTU	30	30	30



The detail operational and compliance water quality samplings programmes are also summarised in the table below.

Table C.4.1.2: Beaufort West Municipality's Water Quality Sampling Programmes							
Town	Operational Monitoring			Compliance Monitoring			No. of sampling points
	Raw Water	Filter Water	Final Water	Frequency	Map of Sampling Points	No. of Sampling Points	
Beaufort West	Quality of intake water: Little variation pH (Daily) Turbidity (Daily)	pH (Daily) Turbidity (Every 2 hours)	pH (Daily) Turbidity (Daily) Chlorine (3 / day) Mn (Weekly) Fe (Weekly) Alum (Weekly)	Final Water reservoir pH (Daily) Turbidity (Daily) Chlorine (Daily) Mn, Fe, Alum (Weekly)	Yes	12	12 Points per month
Merweville	Chlorine (Daily)			pH (Weekly) Turbidity (Weekly) Chlorine (Weekly) Mn, Fe, Alum (Weekly)	Yes	5	5 Points per month
Nelspoort	Chlorine (Daily)			pH (Weekly) Turbidity (Weekly) Chlorine (Weekly) Mn, Fe, Alum (Weekly)	Yes	5	5 Points per month
Murraysburg	Chlorine (Daily)			pH (Weekly) Turbidity (Weekly) Chlorine (Weekly) Mn, Fe, Alum (Weekly)	Yes	2	2 Points per month

Notes: Merweville Distribution Network Frequency – Water is sent through to Beaufort West on a weekly basis for testing or when there is an opportunity to send a sample through.
Nelspoort and Murraysburg Distribution Networks Frequency – Water is sent through to Beaufort West on a weekly basis for testing.

The table below indicates the compliance of the E.Coli monitoring frequency in the water distribution systems of the Beaufort West Municipality, in terms of the minimum requirements of SANS:241-2: 2011 (Table 2). The period assessed was for samples taken from July 2014 to June 2015.

Table C.4.1.3: Current and required monthly sampling for E.Coli (or faecal coliforms) in the distribution systems			
Distribution System	Population Served	Required number of monthly samples (SANS 241-2:2011: Table 2)	Average Number of monthly Microbiological samples taken by Mun during 2014/2015
Beaufort West	35 642	7.1	12
Merweville	1 665	2	1
Nelspoort	1 750	2	0
Murraysburg	5 301	2	2.2

From the above table it can be noted that the number of microbiological samples taken by Beaufort West Municipality over the last year for the Merweville and Nelspoort systems were not adequate.



Operational monitoring of process indicators shall comply with the minimum requirement specified in SANS 241:2011 for characterising raw water quality, on-going levels of operational efficiency in a water treatment system and acceptable final water quality to the point of delivery, as summarised in Table C 4.1.4 below.

Table C.4.1.4: Minimum monitoring frequency for process indicators (SANS241-2:2011: Table 1)			
Determinand	Intake Water	Final Water	Distribution System
Conductivity or total dissolved solids	Daily	Daily	-
pH value	Daily	Once per shift ^a	Fortnightly
Turbidity	Daily	Once per shift ^a	Fortnightly
Disinfectant residuals ^b	Not applicable	Once per shift ^a	Fortnightly
E.Coli (or faecal coliforms) ^c	Not applicable	Weekly	Fortnightly but dependent on population served ^d
Heterotrophic plate count ^c	Not applicable	Weekly	Fortnightly
Treatment chemicals	Not applicable	Weekly	Fortnightly
<p>a: A shift is defined as an eight-hour work period.</p> <p>b: Disinfection shall be sustained at a value defined by the water services institution and water services intermediary throughout the distribution system such that the water services institution and water services intermediary ensure that all microbiological indicators listed in SANS 241-1:2011, table 1, are achieved on a continuous basis.</p> <p>c: If non-compliant with the numerical limits specified in SANS 241-1, implement corrective action and instigate immediate follow-up sampling at an increased sampling frequency.</p>			

It can be noted from the above table that the following additional operational samples need to be taken by Beaufort West Municipality.

- Beaufort West:
 - Conductivity of raw water needs to be taken daily.
 - Conductivity of final water daily.
 - E.Coli of final water weekly.
- Merweville, Nelspoort and Murraysburg:
 - Conductivity, pH and Turbidity of raw water need to be taken daily.
 - Conductivity, pH, Turbidity and Free Chlorine of final water daily.
 - E.Coli of final water weekly.
- All Distribution Systems: pH, Turbidity, Free Chlorine and E.Coli fortnightly.

These requirements may be relaxed to a monthly frequency for groundwater supply systems (due to the reduced variability of groundwater quality), provided that no health-related determinands are detected at levels exceeding the numerical limits in SANS 241-1 during the risk assessment.



The table below gives an overview of Beaufort West Municipality's compliance sampling programme for wastewater (final effluent) quality.

Table C.4.1.5: 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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
1	Beaufort West WWTW	Yes	Yes	Yes	Microbiological			
					E Coli (org/100ml)	30	30	30
					Chemical			
					Ammonia Nitrogen as N (mg/l)	30	30	30
					Nitrate / Nitrite Nitrogen	30	30	30
					Fluoride as F (mg/l)	30	30	30
					Ortho Phosphate as P (mg/l)	30	30	30
					COD (mg/l)	30	30	30
					Physical			
					pH	30	30	30
					TSS (mg/l)	30	30	30
					Conductivity	30	30	30

Table C.4.1.5: 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	FY2014/15	FY2013/14	FY2012/13		FY2014/15	FY2013/14	FY2012/13
1	Merweville WWTW	Yes	Yes	Yes	Microbiological			
2	Nelspoort WWTW	Yes	Yes	Yes	E Coli (org/100ml)	30	30	30
					Chemical			
					Ammonia Nitrogen as N (mg/l)	30	30	30
					COD (mg/l)	30	30	30
					Physical			
					pH at 25°C	30	30	30
					Total Suspended Solids (mg/l)	30	30	30
					Electrical Conductivity (mS/m)	30	30	30

Beaufort West Municipality's Operational and Compliance Wastewater Quality Sampling Programmes are also summarised in the table below.

Table C.4.1.6: Beaufort West Municipality's Waste Water Quality Sampling Programme

WWTW	Operational Monitoring		Compliance Monitoring
	Sampling Points (Number of samples / month)	Type of Tests	Final Effluent (Number of samples / month)
Beaufort West	Raw inflow (2) Secondary settle tank (Bio-filters) (2) Secondary settle tank (Activated Sludges) (2) Final effluent (2)	pH Electrical Conductivity Suspended Solids Chemical Oxygen Demand Ammonia	pH (2) Electrical Conductivity (2) Suspended Solids (2) Chemical Oxygen Demand (2) Ammonia (2) Nitrate / Nitrite (2) E.Coli (2) Fluoride (2) Ortho Phosphate (2)
Merweville	Raw Inflow (1) Oxidation Ponds (1)	pH Electrical Conductivity Suspended Solids Chemical Oxygen Demand	pH (1) Electrical Conductivity (1) Suspended Solids (1) Chemical Oxygen Demand (1)



Table C.4.1.6: Beaufort West Municipality's Waste Water Quality Sampling Programme			
WWTW	Operational Monitoring		Compliance Monitoring
	Sampling Points (Number of samples / month)	Type of Tests	Final Effluent (Number of samples / month)
		Ammonia	Ammonia (1) E.Coli (1)
Nelspoort	Raw Inflow (1) Oxidation Ponds (1)	pH Electrical Conductivity Suspended Solids Chemical Oxygen Demand Ammonia	pH (1) Electrical Conductivity (1) Suspended Solids (1) Chemical Oxygen Demand (1) Ammonia (1) E. Coli (1)

The table below gives an overview of the compliance with regard to the water quality and the final effluent compliance sampling programmes.

Table C.4.1.7: Compliance to the Sampling Programme (s)													
Measurable / Enabling Factor	Unit	Year 0				Year-1				Year-2			
		FY2014/15				FY2013/14				FY2012/13			
		M	C	P	O	M	C	P	O	M	C	P	O
Potable Water Quality													
Supply system submissions	Nr registered	4	4	4	4	4	4	4	4	4	4	4	4
	Nr submitted	4	1	4	4	4	1	4	4	4	1	3	4
	Annual %	98%	31%	88%	100%	94%	31%	94%	98%	93%	25%	85%	98%
Monitoring compliance	Average %	100%	94%	97%	91%	99%	94%	98%	95%	98%	94%	96%	97%
Data Credibility	Average %	95%	99%	100%	100%	94%	92%	98%	100%	97%	77%	97%	100%
BDS In-Time Submission	Annual %	97%	100%	99%	99%	97%	74%	95%	99%	86%	39%	86%	98%
Wastewater Quality													
Monitoring compliance	Average %	45%				56%				65%			
Operational monitoring compliance	Average %	Not captured on GDS and recorded by Process Controllers at each of the WWTW											

Legend

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

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

Table C.4.1.8: Water Quality Monitoring Overview from WSDP Guide Framework Perspective					
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0	Year - 1	Year - 2
			FY2014/15	FY2013/14	FY2012/13
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 %	85%	85%	85%
9.2.3	% of water abstracted monitored: External Sources (Bulk purchase)	Q monitored own / Q purchased in %	N/A	N/A	N/A
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.4.1.9 : Wastewater Quality Monitoring Overview from WSDP Guide Framework Perspective					
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0	Year - 1	Year - 2
			FY2014/15	FY2013/14	FY2012/13
5.3.1	Monitoring and Sample Failure				
5.3.1.1	Monitoring: % of tests performed as required by general limits /special limits/ license requirements (Average % over previous 12 months)	Annual %	45%	55%	65%
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 WWTWs		
6.4	Wastewater Supply and Quality				
6.4.2	Process Control in place	yes/total WWTW in %	75%	75%	75%
6.4.3	Monitoring Programme in place	yes/total WWTW in %	75%	75%	75%
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	Quality of water returned to the resource: urban	yes/total WWTW in %	100%	100%	100%
9.3.3	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 %	100%	100%	100%
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 the quality of treated effluent discharged from WWTWs, 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 six year of existence and promises to be the catalyst for sustainable improvement of South African drinking water quality management in its entirety. The blue drop performance of Beaufort West is summarised as follows in the DWS's 2012 Blue Drop Report:

Table C.4.1.10: Blue Drop Performance of the Municipality (DWS's 2012 Blue Drop Report)	
Municipal Blue Drop Score	94.91%
<p>Regulatory Impression: Beaufort West Municipality is complimented for the amount of work officials did during the year to maintain excellent drinking water quality management in their water supply systems, particularly in spite of limited resources. The supply system at Beaufort West once again scored very well; presenting the Karoo town again with the achievement of the coveted Blue Drop certification. The DWA salutes the commitment of all officials involved and encourages the Municipality to proceed with the admirable work and to endeavour towards hoisting the Blue Drop flag in both Merweville and Nelspoort as well.</p> <ol style="list-style-type: none"> The reclamation plant that was constructed is a commendable example of how water stressed community can manage scarce water resources. Beaufort West Municipality insured that, through their water safety planning risk management, the water resources (aquifers) used for water supply were not affected by the widely reported petrol leakages during the assessment cycle period. It is expected that this will be monitored continuously. It was noted that the relatively low compliance at Nelspoort is not reflective of actual improved quality since this was proven by re-sampling. Attention should thus be given to sampling procedures to ensure credible analysis results. The municipality must also seriously consider subjecting all process controllers to relevant training which will lead to higher classifications. <p>Site Inspection Score for Beaufort West WTW 88.9%</p>	

Performance Area	Beaufort West	Merweville	Nelspoort
Water Safety Planning	93	83	77
Treatment Process Management	85	40	40
DWQ Compliance	100	100	62
Management, Accountability	100	100	100
Asset Management	92	73	70



Performance Area	Beaufort West	Merweville	Nelspoort
Bonus Scores	1.60	2.39	4.51
Penalties	0	0	0
Blue Drop Score (2012)	96.27%	86.43%	74.45%
Blue Drop Score (2011)	95.44%	79.71%	61.21%
Blue Drop Score (2010)	95.00%	86.25%	70.13%
System Design Capacity (Ml/d)	12.400	4.500	0.430
Operational Capacity (% ito Design)	36.29%	6.30%	41.86%
Population Served	37 101	1 240	3 485
Average daily consumption (l/p/d)	121.29	228.49	12.34
Microbiological Compliance (%)	97.9%	99.9%	85.7%
Chemical Compliance (%)	99.9%	99.9%	99.9%

The 2013 Blue 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 distribution system and WTW, compared to the previous year’s risks profile. This tool to collect, assess and report the risk profile is called the Blue Drop Progress Assessment Tool (PAT). The PAT progress assessment period was done on compliance data, information and actions during January 2012 – December 2012, which represents the year immediately following the 2012 Blue Drop assessment period. The results for Beaufort West Municipality were summarised as follows in DWS’s 2013 Blue Drop Risk Profile Progress Report.

Table C.4.1.11: DWS’s 2013 Blue Drop Risk Profile Progress Report results for Beaufort West Municipality					
Municipal Blue Drop Risk Rating					40.89%
<p>Regulatory Impression: The Beaufort West Local Municipality is commended on their continued efforts of ensuring improved drinking water quality management. It should however be noted that the Murraysburg DMA supply system was once again not presented for assessment. The municipality is encouraged to investigate and clarify this system’s future inclusion in preparation for the 2013 Blue Water Services Audits.</p> <p>The municipality needs to look at compliance of process control staff with the Draft Regulation 17 in all the systems.</p> <p>Beaufort West Local Municipality notably improved on their Micro Monitoring Programme Compliance (%) within the Merweville and Nelspoort systems, whilst maintaining the compliance within the Beaufort West system. With a significant increase in its water demand, the Nelspoort system also noted an improved drinking water quality compliance from that reported within 2012 Blue Drop Report. The municipality is therefore commended on maintaining drinking water compliance within all the systems.</p> <p>Based on the good progress achieved within their Water Safety Planning process the municipality is encouraged to ensure that this process is continually updated and amended to address the ever changing risk management of the municipality.</p>					
Assessment Area	Beaufort West		Merweville		Nelspoort
Process Control RR	53.49%		60.00%		62.16%
Drinking Water Quality RR	11.11%		11.11%		11.11%
Risk Management RR	30.43%		60.87%		60.87%
Microbiological Quality	98.70%		>99.99%		>99.99%
Chemical Quality	>99.99%		>99.99%		>99.99%
Blue Drop Risk Rating 2013	40.92%		33.54%		48.80%
Blue Drop Risk Rating 2012 (+ Progress Indicator)	82.63%	IMPROVE	40.83%	IMPROVE	73.71% IMPROVE
Upgrades Capital Expenditure (Rm)	R 0		R 0		R 0

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 waste water treatment. Green drop status is awarded to those WSAs that comply with 90% criteria on key selected indicators on waste water quality management.



The green drop performance of Beaufort West Municipality is summarised as follows in the DWS's 2013 Green Drop Report.

Table C.4.1.12: Green Drop Performance of the Municipality (DWS's 2013 Green Drop Report)				
Average Green Drop Score		2009 – 43.00%, 2011 – 89.50%, 2013 - 79.55%		
Regulatory Impression: The Beaufort West team is maintaining an impeccable record and is performing at peak, with one Green Drop Certificate and two-near misses on Certification. The team's preparation was exemplary, with special reference to the commitment of the Technical Director and Mrs de Bod, as well as the extended time offered to finalise the audits. The inspection panel remarked; "... the municipal team knows their business and display a positive attitude towards the employer..."				
Regrettably, the low score awarded for the Murraysburg system, resulted in an overall decrease in the municipal Green Drop score 89.5% to 79.6%. The Regulator notes that the overall score would have exceeded 90% had it not been for the Murraysburg system. Improved scores are noted for all systems in both Green Drop- and risk rating CRR scores, with all plants now residing in low and moderated risk space, with the exception of Murraysburg which is at a concernable critical risk position. The systems are carrying forward the gains of the 2011 findings, but further work needs to be done in the areas of risk management, treatment capacity and planning, and asset management. The Murraysburg plant was transferred to the WSA from the District Municipality in July 2011, with some human resource and budget matters that need to be resolved. The Regulator therefore understands the predicament, but have full confidence that Beaufort West will elevate the status of the added plant in the next Green Drop cycle.				
The Regulator is not satisfied with the performance of wastewater services in ALL the Murraysburg system. The WSA is to submit Corrective Action Plans to DWS within 30 days of release of the Green Drop Report.				
Green Drop findings:				
1. The Murraysburg system is failing on all 8 Green Drop criteria, of which the lack of design capacity, flows and chemical physical compliance monitoring is most prominent.				
2. The Merweville and Nelspoort plants can improve on the technical skills and registration against Regulation 17, as well as some gaps find in the operational logbook (Merweville) records and maintenance manual (Nelspoort), as well as a lack of adequate training and knowledge transfer events.				
3. Good work has been done in terms of W ₂ RAP development, but implementation and resources to support implementation remains a concern.				
4. Three of the plants do not have (verifiable) flow records or have reached their design capacity, placing these plants at high risk and creating an uncertainty regarding forward planning. Problems experienced with flow meters are noted and risk mitigation measures need to be elevated to resolve these as they occur.				
GREEN DROP REPORT CARD				
Key Performance Area	Beaufort West	Merweville	Nelspoort	Murraysburg
Process Control and Maintenance Skills	99	72	74	28
Monitoring Programme	98	100	90	37
Submission of Results	100	100	100	0
Effluent Quality Compliance	100	100	95	0
Risk Management	82	82	82	0
Local Regulation	100	100	100	40
Treatment Capacity	70	42	83	0
Asset Management	81	72	78	10
Bonus Scores	1.97	1.45	2.16	3.60
Penalties	0.68	0.00	0.38	3.00
Green Drop Score (2013)	93.73%	88.70%	89.08%	12.45%
Green Drop Score (2011)	90.70%	58.60%	87.90%	NA (0%)
Green Drop Score (2009)	83.00%	20.00%	26.00%	NA (0%)
System Design Capacity (Ml/d)	4.600	0.039	0.160	NI
Capacity Utilisation (% ADWF ito Design Capacity)	50.74%	NI (151.00%)	100.00%	NI (151.00%)
Resource Discharged into	No discharge, effluent reuse for irrigation and reclamation	No discharge	No discharge	Overflow to field 400m from Buffels river
Microbiological Compliance	100.00%	NMR	NMR	83.33%
Chemical Compliance	95.97%	NMR	NMR	0.00%
Physical Compliance	100.00%	NMR	NMR	0.00%
Overall Compliance	98.08%	NMR	NMR	10.42%
Wastewater Risk Rating (2012)	35.30%	23.50%	29.40%	NA (100%)
Wastewater Risk Rating (2013)	23.53%	58.82%	64.71%	94.12%



C.4.2. Water Quality Compliance

The table below gives an overview of Beaufort West 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				Year-1				Year-2			
			FY2014/15				FY2013/14				FY2012/13			
			M	C	P	O	M	C	P	O	M	C	P	O
	Results per the Blue Drop System													
n/a	Analysis compliance	Total	234	260	731	3206	234	242	862	3600	183	197	636	2862
n/a		Nr Failures	0	2	28	86	0	16	30	61	0	1	19	32
n/a		Compliance %	100%	99%	96%	97%	100%	93%	97%	98%	100%	99%	97%	99%
n/a	Samples frequency	Total	232	17	250	2646	233	16	301	2891	182	13	220	2333
n/a		Nr Failures	0	2	24	82	0	3	26	61	0	1	19	32
n/a		Compliance %	100%	88%	90%	97%	100%	81%	91%	98%	100%	92%	91%	99%
n/a	Sites compliance	Total	225	17	158	283	224	16	180	289	177	13	142	238
n/a		Nr Failures	0	2	24	48	0	3	26	48	0	1	17	22
n/a		Compliance %	100%	88%	85%	83%	100%	81%	86%	83%	100%	92%	88%	91%
6.3	Water Supply and Quality													
6.3.6	Blue Drop Status	last year certified by DWS	Blue Drop Score not yet published				40.89% (Blue Drop Risk Rating)				94.91% Blue Drop Score			
9.3	Water Quality													
9.3.10	% Time (days) within SANS 241 standards per year	Average of analysis compliance %	98%				97%				99%			

Legend

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

The water quality compliance sample results are included in Annexure C for each of the distribution systems. The table below gives an overview of the number of samples taken over the period July 2014 to June 2015 for the various water distribution networks.

Table C.4.2.2: Number of water quality samples taken throughout the various water distribution systems during the 2014/2015 financial year				
Number of Sampling points within distribution system	12	4	5	2
Parameter Sampled	Beaufort West	Merweville	Nelspoort	Murraysburg
Free Chlorine	81	18	16	16
Conductivity	81	17	16	13
Turbidity	83	17	16	16
pH	82	17	16	13
Iron	81	17	16	13
Manganese	81	17	16	13
Aluminium	81	-	-	13
E.Coli	144	12	25	26
Total	714	115	121	123



The overall percentage of compliance of the water quality samples taken over the period July 2014 to June 2015 is summarised in the table below per distribution system (DWS's 2014 Blue Drop Limits).

Table C.4.2.3: Percentage compliance of the water quality samples for the period July 2014 to June 2015		
Performance Indicator	Performance Indicator categorised as unacceptable Yes / No (Table 4 of SANS 241-2:2011)	% Sample Compliance according to DWA's 2014 Blue Drop Limits
Beaufort West		
Acute Health – 1 Microbiological	No (Excellent)	100.0%
Chronic Health	No (Excellent)	97.9%
Aesthetic	No (Excellent)	99.7%
Risk assessment defined Health (Acute or Chronic)	No (Excellent)	98.7%
Operational Efficiency	No (Excellent)	98.0%
Merweville		
Acute Health – 1 Microbiological	No (Excellent)	100.0%
Chronic Health	No (Excellent)	96.2%
Aesthetic	No (Excellent)	100.0%
Risk assessment defined Health (Acute or Chronic)	No (Excellent)	96.9%
Operational Efficiency	No (Excellent)	97.1%
Nelspoort		
Acute Health – 1 Microbiological	No (Excellent)	100.0%
Chronic Health	No (Excellent)	97.9%
Aesthetic	Yes (Unacceptable)	76.6%
Risk assessment defined Health (Acute or Chronic)	No (Excellent)	97.9%
Operational Efficiency	Yes (Unacceptable)	84.4%
Murraysburg		
Acute Health – 1 Microbiological	No (Excellent)	100.0%
Chronic Health	No (Excellent)	100.0%
Aesthetic	No (Excellent)	98.2%
Risk assessment defined Health (Acute or Chronic)	No (Excellent)	100.0%
Operational Efficiency	No (Excellent)	95.2%

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: Five 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 - 1	Routinely quantifiable determinand that poses an immediate unacceptable health risk if consumed with water at concentration values exceeding the numerical limits specified in SANS 241.
Acute Health - 2	Determinand that is presently not easily quantifiable and lacks information pertaining to viability and human infectivity which, however, does pose immediate unacceptable health risks if consumed with water at concentration values exceeding the numerical limits specified in 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 Beaufort West Municipality's wastewater quality compliance.

Table C.4.2.5: Overview of Wastewater Quality Compliance														
WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0				Year-1				Year-2			
			FY2014/15				FY2013/14				FY2012/13			
			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 %	25%	23%	23%	N/A	21%	23%	23%	N/A	31%	23%	22%	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	Average % of sample failure	Failure %	75%	77%	77%	N/A	79%	77%	77%	N/A	69%	77%	78%	N/A
5.3.1.4														
5.3.1.5														
6.3	Water Supply and Quality													
6.4.6	Green Drop Status	last year certified by DWS	Risk Ratings not yet published				79.55% Green Drop Score				Risk Ratings were determined for each WWTW (PAT)			

Legend

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

The overall percentage compliance of the final effluent samples taken over the period July 2014 to June 2015 at the Beaufort West, Merweville and Nelspoort WWTW is summarised in the table below.

Table C.4.2.6: Percentage Microbiological (E.Coli) compliance of the compliance samples taken at the various WWTWs			
WWTW	Number of Samples Taken	Number of Samples Complying with General Standards	Percentage Compliance
Beaufort West	12	12	100.0%
Merweville	No analysis was done as final oxidation dam is still empty		
Nelspoort	12	11	91.7%
Total	24	23	95.8%

Table C.4.2.7: Percentage chemical compliance of the compliance samples taken at the various WWTWs														
WWTW	Number of Compliance Samples Taken				Number of Samples Complying with General Standards				Percentage Compliance					
	Ammonia	& Nitrites Nitrates	COD	Ortho Phosphate	Ammonia	& Nitrites Nitrates	COD	Ortho Phosphate	Ammonia	& Nitrites Nitrates	COD	Ortho Phosphate	Overall	
Beaufort West	12	12	12	12	5	12	12	12	41.7%	100.0%	100.0%	100.0%	85.4%	
Merweville	N/A	N/A	8	N/A	N/A	N/A	8	N/A	N/A	N/A	100.0%	N/A	100.0%	
Nelspoort	N/A	N/A	9	N/A	N/A	N/A	7	N/A	N/A	N/A	77.8%	N/A	77.8%	
Total	12	12	29	12	5	12	27	12	41.7%	100.0%	93.1%	100.0%	86.2%	



Table C.4.2.8: Percentage physical compliance of the compliance samples taken at the various WWTWs										
WWTW	Number of Compliance Samples Taken			Number of Samples Complying with General Standards			Percentage Compliance			
	pH	Electrical Conductivity	Total Suspended Solids	pH	Electrical Conductivity	Total Suspended Solids	pH	Electrical Conductivity	Total Suspended Solids	Overall
Beaufort West	12	12	12	12	11	12	100.0%	91.7%	100.0%	97.2%
Merweville	8	8	N/A	8	8	N/A	100.0%	100.0%	N/A	100.0%
Nelspoort	9	9	N/A	9	0	N/A	100.0%	0.0%	N/A	50.0%
Total	29	29	12	29	19	12	100.0%	65.5%	100.0%	85.7%

The percentage compliance per parameter per WWTW is also included in Annexure C.

C.4.3. Incident Management

A Water Safety Plan is in place for the water distribution systems and WTWs. A risk assessment was executed and the existing control measures implemented by Beaufort West Municipality were evaluated as part of the process. An improvement / upgrade plan was also compiled as part of the Water Safety Plan process.

A W₂RAP for the various WWTW is also in place. The W₂RAP 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 W₂RAP Teams of Beaufort West Municipality are committed to meet regularly to review the implementation of all the aspects of the Water Safety Plan and W₂RAP 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 W₂RAP 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 Beaufort West Municipality's Water Safety Plan and W₂RAP. 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. Operational Alert Levels are also in place for the various WTWs and WWTWs in order to ensure that the various unit processes in the plant performs optimally. If these pre-determined Alert Levels are exceeded at any of the control points where samples are taken for operational purposes, specific actions are taken to bring the operational parameters back to within the target ranges.

Beaufort West 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.

**Table C.4.3.1: Incident Management and Reporting Overview**

WSDP Ref #	Measurable / Enabling Factor	Unit	Year 0	Year - 1	Year - 2
			FY2014/15	FY2013/14	FY2012/13
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 / 100%	Yes / 100%

Table C.4.3.2: Water Quality Incident Reporting Compliance (Health Oriented)

Measurable / Enabling Factor	Unit	Year 0				Year-1				Year-2			
		FY2014/15				FY2013/14				FY2012/13			
		Acute Health - 1 Microbiological	Acute Health - 1 Chemical	Acute Health - 2 Microbiological	Chronic Health	Acute Health - 1 Microbiological	Acute Health - 1 Chemical	Acute Health - 2 Microbiological	Chronic Health	Acute Health - 1 Microbiological	Acute Health - 1 Chemical	Acute Health - 2 Microbiological	Chronic Health
Failures in terms of Analysis	Total nr	259	36		239	185	26		171	-	-	-	-
	Nr of failures	0	0		2	0	0		16	-	-	-	-
	Failure %	0.0%	0.0%		0.8%	0.0%	0.0%		9.4%	-	-	-	-
	Nr reported	0	0		2	0	0		16	-	-	-	-
	Reported % of failure	100%	100%		100%	100%	100%		100%	-	-	-	-
Failures in terms of Samples	Total	244	18		18	175	13		13	-	-	-	-
	Nr of failures	0	0		2	0	0		3	-	-	-	-
	Failure %	0.0%	0.0%		11.1%	0.0%	0.0%		23.1%	-	-	-	-
	Nr reported	0	0		2	0	0		3	-	-	-	-
	Reported % of failure	100%	100%		100%	100%	100%		100%	-	-	-	-
Failures in terms of Sites	Total	225	17		17	172	13		13	-	-	-	-
	Nr of failures	0	0		2	0	0		3	-	-	-	-
	Failure %	0.0%	0.0%		11.8%	0.0%	0.0%		23.1%	-	-	-	-
	Nr reported	0	0		2	0	0		3	-	-	-	-
	Reported % of failure	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 Beaufort West 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	
			2014/15		2013/14		2012/13		2014/15		2013/14		2012/13	
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	11,784	100%	11,549	100%	11,040	100%	0	0%	0	0%	0	0%
7.1.1.3		Reticulation leaks fixed ¹⁾	918	100%	768	100%	1,103	100%	0	0%	0	0%	0	0%
7.1.1.4		Illegal connections formalized	Unknown		Unknown		Unknown		0	0%	0	0%	0	0%
7.1.1.5		Un-metered connections, metered	Unknown		Unknown		Unknown		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	5,313	46.7%	5,203	46.7%	4,965	46.7%	0	0%	0	0%	0	0%
7.1.2.2		300 kPa - 600 kPa	6,041	53.1%	5,916	53.1%	5,646	53.1%	0	0%	0	0%	0	0%
7.1.2.3		600 kPa - 900 kPa	23	0.2%	22	0.2%	21	0.2%	0	0%	0	0%	0	0%
7.1.2.4	10.2.b.iii	> 900 kPa	0	0.0%	0	0.0%	0	0.0%	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 ²⁾	1,366	12%	1,291	11%	1,680	15%	0	0%	0	0%	0	0%
7.1.3.2	10.2.g.iv	Retro-fitting of water inefficient toilets ³⁾	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.3.3		Meter repair programme ⁴⁾	1,078	9%	838	7%	1,147	10%	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	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
7.1.4.2		Number of consumers (people) targeted by public information programmes	44,358	100%	43,711	100%	43,073	100%	0	0%	0	0%	0	0%

- Notes:
- 1) Burst pipes in road reserves + Repair leaks at water meters
 - 2) Leaks at households, pipelines and taps
 - 3) All Municipal Buildings are provided with dry systems
 - 4) Test/Replace Meter + Repair faulty pre-paid meter + Replace prepaid meter



Beaufort West Municipality has made significant progress in implementing specific WC/WDM interventions. A detailed water meter audit was carried out during 2008/2009. A Long Term WC/WDM Strategy was further developed for Beaufort West Municipality during June 2011, with funding support from the DWS. The WC/WDM Strategy was taken to Council on the 14th of November 2012. A four block step tariff system is implemented by the Municipality, which discourage wasteful or inefficient use of water. The Municipality continued with the further implementation of Pressure Management measures in the Beaufort West distribution system, which was started in 2010.

Pressure Management was identified by Beaufort West Municipality as one of the possible initiatives to reduce leakage and water demand and also to prolong the life expectancy of the existing asbestos cement pipes. The primary objectives of the pressure management project are as follows:

- Determining the scope for pressure management.
- Implementing pressure management where feasible.
- Measurement of the impact of pressure management post implementation.

The percentage non-revenue water, as included in the Water Balance Models for each of the towns, was updated up to the end of June 2015 as part of the Water Services Audit Process. The overall percentage of non-revenue water for Beaufort West Municipality for the 2014/2015 financial year was calculated as 50.29%. The models are included in Annexure A. Bulk water meter readings are not yet available for Murraysburg and no model was therefore developed for Murraysburg.

The graph below gives a summary of the System Input Volume (Bulk Potable Supply) and the non-revenue water for the various water distribution systems in Beaufort West Municipality's Management Area.

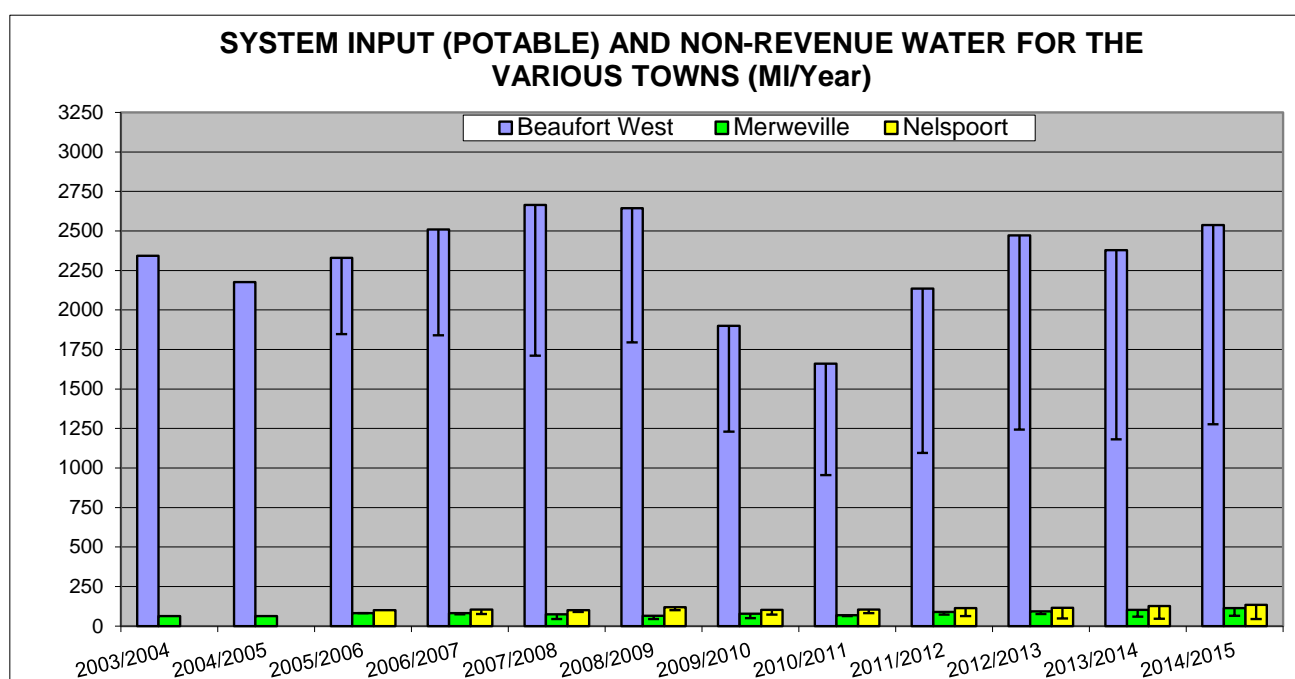


Figure C.5.1: System Input and Non-revenue Water for the Various Towns



Quantity of water unaccounted for (MI/year):

The existing NRW for the various distribution systems are very high and it is estimated that it is as a result of the billing system. The Municipality replaced various prepaid water meters over the last financial year in order to ensure that their future consumption is registered through the financial system. The water losses on the bulk distribution system, which include the treatment losses, were less than 6% for the last financial year. The high losses are on the internal distribution system, due to inaccurate billing records and the pre-paid metering system used for the free water. The completion of the new billing system will ensure accurate communication between the individual meters and the Municipality's Financial System.

The table below gives a summary of the NRW for the various distribution systems in Beaufort West Municipality's Management Area.

Table C.5.2: NRW and ILI for the various distribution systems in Beaufort West Municipality's Management Area						
Description	Unit	14/15	Record : Prior (MI/a)			
			13/14	12/13	11/12	10/11
Beaufort West	Volume	1 261.822	1 196.249	1 229.356	1 040.564	705.594
	Percentage	49.7%	50.3%	49.7%	48.7%	42.5%
	ILI	5.54	5.35	6.08	5.15	3.61
Merweville	Volume	48.906	42.797	17.063	16.177	5.322
	Percentage	43.1%	41.9%	18.4%	18.3%	7.7%
	ILI	13.90	12.23	5.03	4.32	1.98
Nelspoort	Volume	89.556	80.903	67.251	51.672	21.761
	Percentage	67.3%	64.0%	58.4%	45.3%	21.0%
	ILI	9.24	8.34	7.37	5.65	3.68
Murraysburg	Volume	Bulk water meter readings not yet available				
	Percentage					
	ILI					
TOTAL	Volume	1 400.284	1 319.949	1 313.670	1 108.413	732.677
	Percentage	50.29%	50.64%	49.02%	47.39%	39.96%
	ILI	6.01	5.76	6.32	5.32	3.71

Notes: 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) in the above table 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 and 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.



The percentage NRW for Beaufort West, Merweville and Nelspoort can be summarised as follows:

Beaufort West: The total percentages of NRW (Bulk and network) for Beaufort West were very high at 53.1% for 2013/2014 and 52.0% for 2014/2015. The treatment losses were good at 5.7% for 2013/2014 and 1.1% for 2014/2015. The percentages of NRW for the groundwater bulk distribution pipelines were also low at 4.7% for both 2013/2014 and 2014/2015. The percentages NRW for the internal network were however very high for the last number of financial years at 50.3% for 2013/2014 and 49.7% for 2014/2015. It is estimated that the billed metered consumption, as received from the Finance Department, for Beaufort West is not correct and more specific the volume of prepaid water sold and the volume of free basic water.

Merweville: The total percentages of NRW (Bulk and network) in Merweville were 47.4% for 2013/2014 and 45.3% for 2014/2015. The percentage bulk distribution NRW was reduced from 9.4% for 2013/2014 to 3.9% for 2014/2015. The percentage NRW for the internal network however increased from 41.9% for 2013/2014 to 43.1% for 2014/2015. It is estimated that the billed metered consumption and the volume of free basic water, as received from the Finance Department, is not correct and that the high percentage of network distribution NRW are not real losses.

Nelspoort: The total percentage of NRW (Bulk and network) in Nelspoort is very high at 71.4% for 2013/2014 and 74.8% for 2014/2015. The percentage bulk distribution NRW however increased from 20.4% for 2013/2014 to 23.1% for 2014/2015. It is also estimated that the billed metered consumption and the volume of free basic water, as received from the Finance Department, is not correct and that the high percentage of network distribution NRW are not real water losses.

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

The pressures within the distribution systems of each of the towns were determined through the Water Master Plans. The following table gives a summary of the pressures in the existing systems (Fully occupied – Water Master Plan, CES) and the saving potential, as identified through the Long-Term WC/WDM Strategy process.

Table C.5.3: Potential savings on bulk water supply through the implementation of pressure management (WDM Strategy)			
Distribution System	Saving Potential	Number of consumer connections where pressure rise above 900 kPa	
		Static Pressure	Residual Pressure
Beaufort West	12%	No areas where pressures exceed 90m	Mainly in the 24m to 90m range under peak hour demand conditions, except for a few pipes in the higher lying areas of the Kwa Mandlenkosi PRV zone and one pipe on the most northern part of the system where the residual pressure is between 18m and 24m
Merweville	0%	No areas where pressures exceed 90m	Mainly between the 10m to 24m range under peak hour demand conditions. This is due to the low lying nature of the reservoir.
Nelspoort	20%	No areas where pressures exceed 90m	Mainly in the 24m to 90m range under peak hour demand conditions

The table below gives an overview of the pressure management phases implemented by Beaufort West Municipality.

Table C.5.4: Summary of pressure management phases planned for Beaufort West				
Phase	PRV Area	Logging and Analysis and Pre-Pressure Management Reporting (Completion Dates)	Pressure Management Implementation (Completion Dates)	Post Pressure Management Logging and Reporting (Completion Dates)
1	Hillside West (New Ext)	August 2010	November 2010	September 2011
	Hillside East (Old Ext)	August 2010	November 2010	September 2011
	Kwa-Mandlenkosi	-	Completed a number of years before	August 2010
2	Die Lande	September 2011	Completed	Not yet undertaken
	New Town	September 2011	Completed	Not yet undertaken
3	Rustdene	Completed	Completed	Not yet undertaken
	Essopville	Completed	Completed	Not yet undertaken

**Table C.5.4: Summary of pressure management phases planned for Beaufort West**

Phase	PRV Area	Logging and Analysis and Pre-Pressure Management Reporting (Completion Dates)	Pressure Management Implementation (Completion Dates)	Post Pressure Management Logging and Reporting (Completion Dates)
	Industrial Area	Completed	Completed	Not yet undertaken
4	Main Town	Completed	Under construction	Not yet undertaken

The savings achieved to date in Hillside and Kwa-Mandlenkosi through the pressure management is summarised in the table below:

Table C.5.5: Summary of measured savings through pressure management

Item	Hillside West	Hillside East	Kwa-Mandlenkosi
Average flow before PRV or PRV open	24 m ³ /h	16 m ³ /h	26 m ³ /h
Average flow PRV set	17 m ³ /h (set at 22m)	8 m ³ /h (set at 8m)	22 m ³ /h (set at 30m)
Water savings m ³ /h	7 m ³ /h	8 m ³ /h	4 m ³ /h
% Water Savings	29%	50%	15%
Water Savings m ³ /yr	61 320 m ³ /yr	70 080 m ³ /yr	35 000 m ³ /yr
Savings R/yr @ R4-38 / kl	R269 000 / yr	R307 000 / yr	R150 000 / yr
Total Savings m ³ /yr	166 400 m ³ /yr		
Total Savings @ R4-38 / kl R / yr	R730 000 / yr		

The results of the first phase indicated that significant savings has been achieved through the implementation of pressure management in Hillside West and East and KwaMandlenkosi.

Demand management activities undertaken:

The main water demand management interventions undertaken by Beaufort West Municipality over the last few years were as follows:

- Development of a Long-Term WC/WDM Strategy, with funding support from the DWS.
- Meter and record all bulk water supply, improve quality of data regarding monthly consumer use and implement district metered areas (Water Balances are carried out).
- Implement a four block step water tariff structure that promotes the efficient use of water and discourage wastages.
- Completed a detail water meter audit for Beaufort West, Merweville and Nelspoort, where all the bulk and consumer water meters were surveyed. Regularly checking all consumer water meters, in order to remove all illegal connections.
- Implementation of pressure management in Beaufort West (Four phases, with three phases completed).
- Upgrading of the water telemetry system in order to prevent any reservoirs from overflowing.



Beaufort West Municipality's Long-Term WC/WDM Strategy is summarised in the table below:

Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality	
A.1	Reduce and maintain low levels of water losses through the reticulation system
A.1.1	Reduce and maintain low levels of water losses through Active Leak Control of the reticulation system
A.1.1.1	<u>Decision on how to undertake the work</u> <ul style="list-style-type: none"> The appointment and training of additional staff. The training of existing staff. Appoint an external contractor in the first few years with the objective of using this contractor to train the internal teams and build capacity to do all work internally. The above three options need to include the purchase or re-allocation of equipment. Complete outsourcing of the activity.
A.1.1.2	<u>Leak detection:</u> Identify areas with highest leaks and send teams into the field to detect leaks
A.1.1.3	<u>Repair of leaks once identified:</u> Once leaks were detected they will need to be repaired. Depending on the extent of the leaks and other workloads, the leak repairs need to be carried out by either the internal teams or a contractor.
A.1.2	Reduce and maintain low levels of water losses through pressure management of the reticulation system
	The reticulation networks need to be divided into pressure zones, prior to implementing pressure management, and then metered and logged. The activities of this programme are as follows:
A.1.2.1	Undertake feasibility studies to determine the ranking of areas/projects
A.1.2.2	Implement advanced pressure management in areas identified.
A.1.2.3	The on-going operation, maintenance and optimisation of advanced pressure management installations.
A.1.3	Rehabilitation and replacement of components of the network system
	The age and condition of the various parts of the networks need to be determined. A pipeline management information system needs to be implemented and a Policy needs to be developed as part of the rehabilitation programme. The accepted norm is that all pipes should be replaced every 50 years. The projects and measures that should be implemented under this programme are as follows:
A.1.3.1	Undertake a study to determine the age and condition of the existing pipe networks.
A.1.3.2	Develop a pipeline management information system and record all pipe bursts.
A.1.3.3	Develop a pipeline management policy.
A.1.3.4	Intensify the current rehabilitation programme and ensure all pipes that have frequent bursts are rehabilitated.
A.1.3.5	Develop and start implementing a comprehensive rehabilitation programme
A.1.4	Preventative maintenance
A.1.4.1	Inspection of isolation valves and packing
A.1.4.2	Control valves inspection and maintenance
A.1.4.3	Inspection of cathodic protection of steel pipes
A.1.5	Passive Leak Control
	Consumer perception is very important with regard to WC/WDM. If consumers perceive the Council to be inefficient they will in turn not be prone to use water efficiently. The projects and measures that can be implemented are as follows:
A.1.5.1	Improve the help-line and install an automated answering system
A.1.5.2	Advertise the help-line
A.1.5.3	Investigate current problems in responding to leaks and allocate adequate resources to avoid lengthy delays.
A.1.5.4	Review and develop a policy regarding responses to leaks with the aim of reducing response time, prioritising and keeping consumers informed.
A.1.5.5	Develop a monitoring system and quality assurance measures to ensure problems are resolved adequately.
A.1.6	Develop a uniform O&M Policy
	Most of the staff's current functions are reactive rather than proactive. Staff needs to be allocated responsibilities with regard to performance indicators of the reticulation system and their functions need to be to reach and maintain certain benchmarks. The approach will ensure that staff becomes a lot more proactive. The projects and measures that can be implemented are as follows:
A.1.6.1	Improve and develop O&M policy
A.1.6.2	Train staff on the new approach
A.1.6.3	Monitor the implementation of O&M policies.
A.2	Reduce and maintain low levels of water wastage and inefficient water demand by existing consumers
A.2.1	Implement water tariffs that promote WC&DM
	Implement tariffs as determined by the objectives set out under B.3.1
A.2.2	Educate consumers to reduce water wastage and inefficient use

**Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality**

	The approach of promoting WC/WDM to consumers and society can be divided into a general consumer awareness education campaign for all consumers and a specific awareness campaign associated with focused projects such as plumbing leak repair, retrofitting projects, etc. The projects and measures that can be implemented are as follows:
A.2.2.1	Generic consumer awareness campaign
A.2.2.2	School education (focus on schools)
A.2.2.3	Special events
A.2.2.4	Develop a WC/WDM web page
A.2.3	Regulation to prevent water wastage and inefficient usage and enforcement of penalties for water wastage
	Repairing internal plumbing leaks in low-income areas needs to be coupled with regulation and enforcement around wasting water. Retro-fitting of efficient plumbing fittings needs to be coupled with quality of workmanship and materials that do not result in frequent leakages.
A.2.3.1	Ensure that updated by-laws are in place
A.2.3.2	Enforcement of by-laws
A.2.3.3	Registration of plumbers
A.2.4	Comprehensive water projects in low income areas
	The proposed comprehensive water management programme for low-income areas will vary to the specific conditions of each area but will generally consist of social interventions, technical interventions per household, technical interventions reticulation, regulatory / financial interventions and maintenance programme. The activities of this programme are as follows:
A.2.4.1	Pre-feasibility research and prioritisation of all areas
A.2.4.2	Implementation by area
A.2.4.3	Sustainability, maintenance measures in various areas
A.2.5	Promote and assist domestic consumers to undertake water audits
A.2.5.1	Develop water audit procedure, print and distribute to any consumer on request.
A.2.5.2	Appoint contractors to undertake water audits
A.2.5.3	Manage the on-going implementation
A.2.6	Plumbing retro-fit programme
A.2.6.1	Research and evaluation of case studies and products throughout the world
A.2.6.2	Pilot project in selected suburb
A.2.6.3	Feasibility study for implementing and prioritising the implementation of retrofit throughout the municipality (including the development of water audit database)
A.2.6.4	Roll out of retrofit projects throughout the Municipality
A.2.7	Water-wise gardening scheme
	A water wise incentive scheme can be implemented, which will try and encourage existing consumers to replace grassed areas on their pavement areas with pebbles, change or modify their irrigation systems to drip irrigation and change their gardens to water wise (indigenous) gardens. The proposed activities of this programme that can be budgeted for are as follows:
A.2.7.1	Develop demonstration water wise gardens throughout the Municipality
A.2.7.2	Organise an on-going water-wise garden campaign with the local nursery
A.2.8	Support Programme for Large Consumers (Including Government)
	The objective of such a programme is not limited to assisting consumers in reducing their water demand, but is also to look at wastewater, monitor compliance with by-laws and service conditions and offer general customer support. The proposed activities of this programme that can be budgeted for are as follows:
A.2.8.1	Train existing staff
A.2.8.2	Identify and visit large consumers
A.2.8.3	Provide assistance and technical know-how where possible
A.2.8.4	Introduce a compulsory water management plan for large consumers
A.2.8.5	Test the accuracy of all large consumer meters
A.2.8.6	Install data-loggers on all large consumer meters
A.2.9	Monitor consumers and inform them of large deviations
A.2.9.1	Create a reporting system
A.2.9.2	Generate letters and post on a monthly basis
A.2.9.3	Monitor trends and follow up telephonically
A.2.10	Reduction of water demand by Municipal Departments
A.2.10.1	Develop efficiency demand targets for water use by each park area.
A.2.10.2	Develop policies regulating the use of water by parks department.



Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality	
A.2.10.3	Modify parks to water wise gardens projects
A.2.10.4	Modify irrigation to efficient irrigation projects
A.2.10.5	Retrofit water-efficient plumbing fittings in all Council owned buildings.
A.2.10.6	Train maintenance and operations staff.
A.2.10.7	Monitor consumptions at Parks and Council Buildings.
A.3	Increase use of alternative water resources
A.3.1	Educate consumers to increase the use of alternative sources
	Refer to Programme A.2.2 for details
A.3.2	Regulation that promotes alternative sources
	Refer to Programme A.2.3 for details
A.3.3	Promote Grey-water recycling
	DWS will develop guidelines and regulations regarding the use of grey water, will research products that can assist with grey water reuse and will initiate a pilot project into grey water reuse at a Municipality.
A.3.4	Promote Consumer Boreholes
A.3.4.1	The Municipality needs to promote, support and manage borehole and well development by private individuals in appropriate areas (Develop pamphlets and identify products and suppliers).
A.3.4.2	The Municipality must install local boreholes for sports grounds, parks, etc.
A.3.5	Promote Rainwater harvesting
	There are various methods of rain harvesting. The most common is the use of tanks to collect water from roofs.
A.3.5.1	Develop / print booklet / posters
A.3.5.2	Promote roof tanks
A.3.6	Increase the volume of treated effluent re-use supplied by municipality
A.3.6.1	Investigate the feasibility of treated effluent recycling to irrigation standard and potable standard.
A.3.6.2	Implement treated effluent recycling.
A.3.6.3	Monitor the quality of treated effluent being recycled.
A.3.6.4	Report on any supply problems experienced by end users
A.4	Ensure the efficient use of water in new developments
A.4.1	Regulation and enforcement to prevent water wastage and promote alternative sources
	Refer to Programme A.2.3 for details
A.4.2	Provide incentives for developers
	<p>Incentives can be developed for new developers to carry out certain practices:</p> <ul style="list-style-type: none"> • Installing water efficient fittings at all water points. • Installing pressure reducing valves at each consumer connection. • Ensuring minimal grassed areas. • Installing bulk meter and individual meters for cluster developments. • Ensuring that products and materials used are SABS approved. • Ensuring that the water supply and drainage design is in accordance with SABS 0252. • Minimising water wastage while carrying out construction. • Designing a water wise garden. • Providing roof tanks for the collection of rain water. • Installing a water recycling system to utilise bath water into gardens (grey water). • Develop boreholes in areas where ground Water Resources are not sensitive. • Utilising recycled effluent from the Municipality's treatment plants where possible. <p>The type of incentives that the Municipality's water department, in conjunction with the town-planning department, could consider for developers are as follows:</p> <ul style="list-style-type: none"> • Give developers who adopt water efficient practises preference to speed up building approval. • Give developers discount on their contribution to bulk infrastructure. • Award developers with an environmental recognition scheme
A.4.2.1	Develop incentive schemes.
A.4.2.2	Develop environmental recognition scheme for developers.
A.4.2.3	Manage implementation of incentive and recognition scheme.
A.4.3	Develop new engineering standards
A.4.3.1	Formalise new standards.
A.4.3.2	Monitor implementation of standards.



Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality	
A.4.4	Incentives to new consumers to minimise inefficient use
	<p>Incentives need to be created for new consumers to implement certain water efficient practices, as with the proposals made for developers. Examples of incentives are as follows:</p> <ul style="list-style-type: none"> • Small reduction in assessment rates. • Subsidies for the purchasing and implementation of water efficient fittings and appliances. • Recognition and rating scheme for water efficient houses and businesses. <p>The activities of this programme that can be budgeted for are as follows:</p> <ul style="list-style-type: none"> • Develop policies of incentives for new consumers • Implement an incentive scheme • Manage the incentive scheme
A.4.5	Develop plumbing standards, particularly for low cost housing
A.4.5.1	Policy development and plumbing standards negotiations with provincial housing department and DWA:
A.4.5.2	Subsidies for the installation of water efficient shower heads, toilets and taps.
A.4.5.3	Initial awareness, education and training of new consumers (workshops)
	On-going effective monitoring, management and awareness measures
B.1	Ensure and maintain adequate information / policies to support decision making
B.1.1	Management Information Systems (MIS)
B.1.1.1	Carry out a detailed investigation on the MIS needs and functionality required and develop a comprehensive terms of reference for tendering.
B.1.1.2	Acquire and implement the different modules of MIS (Network asset management module, Demand management module, Operation and maintenance module, Commercial data analysis module) – Procurement and installation of system.
B.1.1.3	Manage, update and maintain the MIS on an on-going basis.
B.1.2	Establish District Management Areas and Zones (Including metering and logging)
B.1.2.1	Review all existing DMAs and zones, revise and determine new ones where required.
B.1.2.2	Design all new district and zone meters and reticulation changes.
B.1.2.3	Install new district and zone meters, flow and pressure loggers, district and zone valves and implement other reticulation changes.
B.1.2.4	Test the integrity of all new DMAs and carry out any necessary repairs or changes.
B.1.2.5	Test the integrity of all the DMAs regularly by examining loggings and then every two years.
B.1.3	Undertake regular water balance
B.1.3.1	Determine the various non-revenue water components in accordance with the IWA water balance model based on an appropriate Demand analysis MIS (See Programme B.1.1).
B.1.3.2	Employ and train a dedicated or senior technician to manage non-revenue water analysis.
B.1.3.3	Acquire additional data loggers
B.1.3.4	Acquire a suitable software model for a bottom up analysis of real losses.
B.1.3.5	Telemetry for bulk meters (See Programme B.1.4)
B.1.4	Upgrade the telemetry system
	The type of functionality that telemetry systems should be considered for are to optimise the operation and maintenance of key water supply components and to monitor and control the water demand. The activities of this programme that can be budgeted for are as follows:
B.1.4.1	Carry out a detailed investigation on the existing telemetry status and determine a uniform policy and implementation plan for the entire Municipality.
B.1.4.2	Implement new telemetry, for WDM functions and/or rehabilitate and upgrade existing systems.
B.1.4.3	Develop the required links between the telemetry system and the MIS.
B.1.4.4	Manage, update, operate and maintain the telemetry system.
B.1.5	End-use and consumer behaviour research
B.1.5.1	Distribute and collect consumer demand analysis questionnaires
B.1.5.2	Carry out water audits and consumer behaviour, opinions and knowledge surveys
B.1.5.3	Carry out an end-use research audit
B.1.5.4	Capture all information on to demand analysis MIS module
B.1.5.5	Initiate benchmarks of various consumers in association with DWA
B.1.5.6	Analyse water audits, develop end use analysis parameters on MIS and revise WC/WDM opportunities.
B.1.6	Development of decision-making policies on WC/WDM
B.1.6.1	Development of draft policies
B.1.6.2	Inform all personnel of policies and train if required



Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality	
B.1.6.3	Update policies
B.2	Ensure all decisions are supported by integrated water resource planning (IRP)
B.2.1	Ensure the use of IRP principles for water resource planning
B.2.1.1	Participate in water resource planning processes initiated by DWA.
B.2.1.2	Undertake to investigate the WC/WDM measures in more detail.
B.2.1.3	Develop a component based demand forecasting model.
B.2.2	On-going review of the impact of WC/DM on proposed new bulk infrastructure
B.2.2.1	Develop a planning protocol to be used by the Municipality for all Water Services bulk infrastructure planning.
B.2.2.2	Review the possible impact of WC/WDM on the planning of the wastewater system and prioritise certain WC/WDM initiatives. Incorporate WC/WDM into the master plan of the wastewater system.
B.2.2.3	Review the possible impact of WC/WDM on the planning of the bulk-water supply system and prioritise certain WC/WDM initiatives. Incorporate WC/WDM into the master plan of bulk water supply.
B.3	Ensure adequate financial resources and processes to finance WC&WDM and minimise commercial and metering losses
B.3.1	On-going revision of tariffs and tariff structure to promote WC/WDM while at the same time ensuring adequate financial resources.
B.3.1.1	Analyse the effectiveness of existing tariffs from WC/WDM and long term sustainability perspective.
B.3.1.2	Gain understanding of the price elasticity of water in the municipality so as to improve predictions of water reduction based on tariff increases.
B.3.1.3	Adjust tariff structure and tariffs to make them compatible with WC/WDM and long term sustainability objectives
B.3.1.4	Annual revision of tariffs
B.3.2	Introduce informative billing
B.3.2.1	Develop a format of informative billing and make the necessary changes to the billing system
B.3.2.2	Implement a pilot phase of informative billing.
B.3.2.3	Roll out informative billing to all clients
B.3.3	Commercial data validation
B.3.3.1	Acquisition and implementation of a commercial data evaluation information system.
B.3.3.2	Customer data evaluation and verification exercise.
B.3.3.3	Connection / meter data evaluation and verification exercise.
B.3.3.4	Modification and on-going customer and connection data validation.
B.3.4	Meter Management / Replacement Program
	An effective meter management programme needs to achieve the following objectives: <ul style="list-style-type: none"> • Determine an on-going meter replacement programme • Determine exception reports on meters which are suspected to be faulty. • Test and replace faulty meters • Size meters correctly The activities of this programme that need to be budgeted for are as follows:
B.3.4.1	Research and development of a meter replacement policy and rehabilitation programme
B.3.4.2	Implementation of a uniform meter management information system
B.3.4.3	Testing and replacing faulty meters reported by consumers (Part of reticulation function).
B.3.4.4	Replacement of domestic meters with AMR enabled format (where appropriate) in accordance with rehabilitation programme.
B.3.5	Management of meter readings
B.3.5.1	Monitor meter readings and carry out regular checks.
B.3.5.2	Hold regular meetings with meter readers / contractors and train.
B.3.5.3	Review meter cycles, costs and procedures by meter readers and revise if necessary.
B.3.5.4	Respond to any exception reports (reported leaks, damaged meters, water wastage, etc.)
B.3.5.5	Pilot remote reading project
B.3.6	Resolve billing exception reports
B.3.6.1	Identify all meters that are not read regularly and resolve problems (i.e. reallocate, clean)
B.3.6.2	Identify all meter and erf discrepancies and resolve problems.
B.3.6.3	Identify all consumer detail discrepancies and resolve problems
B.3.7	Management of large consumer meters
B.3.7.1	Carry out a desktop study / analysis of all large consumers and evaluate if meters are sized correctly and other key



Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality	
	parameters.
B.3.7.2	Carry out on site calibration of all large consumer meters
B.3.7.3	Replace all faulty or incorrect sized meters
B.3.7.4	Implement an on-going oversight function of all large consumer meters and accounts.
B.3.8	Reduction of illegal connections
B.3.8.1	Review / develop policies, procedures and by-laws regarding illegal connections.
B.3.8.2	Carry out an investigation to identify illegal connections throughout the municipality.
B.3.8.3	Disconnect or legalise existing illegal connections
B.3.8.4	Check fire hydrant seals every three years.
B.3.8.5	Police and enforce by-laws with regards to water connections for developers.
B.3.9	Establishment of WC/DM fund
B.3.9.1	Allocate an initial budget for WC/WDM.
B.3.9.2	Develop an agreed methodology for calculating the financial savings achieved from the various WC/WDM measures.
B.3.9.3	Establish a fictitious WC/WDM fund that money is allocated from the savings achieved.
B.3.9.4	Retain / Implement a 10% water restriction tariff and rename it as the WC/WDM tariff.
B.3.10	Seek funding and joint ventures
B.3.10.1	Apply for MIG funding on numerous WC/WDM measures
B.3.10.2	Identify joint venture projects with DWA
B.3.10.3	Develop a risk reward pilot project
B.4	Ensure adequate human resources and human resource processes
B.4.1	Development of suitable component of human resources to implement WC/DM
	Due to the significant challenge of implementing such a comprehensive strategy, it is proposed that for the first two years a specialist professional service provider should be hired on contract basis to assist the Water Services Manager. Such a specialist should assist the manager in establishing appropriate capacity and initiating most of the programmes in the strategy.
B.4.1.1	Develop job descriptions and get approval from organisation structure and any new posts.
B.4.1.2	Advertise and fill in new posts
B.4.1.3	Train and support capacity building of new employees
B.4.1.4	Employee a specialist service provider on a 2 year contract basis.
B.4.2	Development of WC/WDM working procedures and responsibilities
B.4.2.1	Develop responsibilities for the various sections.
B.4.2.2	Develop a WC/WDM working procedure and ethics policy
B.4.2.3	Determine new job functions, re-allocate personnel to WC/WDM related functions and modify, if necessary, employee's job descriptions.
B.5	Ensure adequate stakeholder buy-in and commitment
B.5.1	Political and management buy-in
B.5.1.1	Hold annual workshops with Councillors
B.5.1.2	Appoint political champions and patrons / Mayoral Flagship project
B.5.1.3	Submit annual progress report to Council
B.5.1.4	Carry out pilot retrofit programme at Councillors and senior management's properties
B.5.2	Partnerships and cooperation with other institutions
B.5.2.1	Hold regular discussions with other water users in the region and identify any joint ventures.
B.5.2.2	Hold discussions with Eskom to explore the possibility of joint initiatives and aligning each other's strategy.
B.5.2.3	Hold discussions with other key stakeholders with environmental campaigns and explore the possibility of aligning each other's strategy.
B.5.3	Public Participation
B.5.3.1	Publish and print copies of a summary version of this strategy.
B.5.3.2	Hold individual meetings with key stakeholders
B.5.3.3	Advertise the strategy and invite public comment.
B.5.3.4	Hold various community workshops to discuss the strategy.
B.5.3.5	Hold a launch event for the strategy.
B.5.3.6	Establish a stakeholder and community representative advisory committee.
B.6	Monitor the impact of WC/WDM measures and KPIs
B.6.1	Monitor the impact of WC/WDM measures

**Table C.5.6: Long-Term WC/WDM Strategy of Beaufort West Municipality**

B.6.1.1	Develop a detailed methodology for measuring the performance criteria for each type of WDM project (test and refine).
B.6.1.2	Monitor the impact of all WC/WDM on an on-going basis.
B.6.2	KPIs and Benchmarks on WC/WDM
B.6.2.1	Develop key benchmarks for all KPI and categories and assign responsibility
B.6.2.2	Monitor the key benchmarks for all KPI bi-annually.
B.6.3	Adapt Policies, Strategies and Programmes as more information becomes available.
B.6.3.1	Review and where appropriate adapt Strategy and Objectives
B.6.3.2	Review and where appropriate adapt Programmes and Projects

Progress made with the installation of water efficient devices:

The municipal buildings have been provided with dry systems but no further progress has been made with the installation of water efficient devices at the schools.

C.6. Water Services Infrastructure Management

The most significant challenges, from a Water Services perspective, are the augmentation of the existing groundwater resources for Beaufort West, upgrading of the Nelspoort and Murraysburg oxidation ponds, the refurbishment and upgrading of the existing water and sewer networks and pump stations and to ensure the provision of basic services to rural communities located on private farms. Beaufort West Municipality will continue to develop strategies and action plans, in collaboration with farm owners, in order for the Municipality to fulfil its legal obligations and responsibilities as WSA for the provision of basic services.

Beaufort West Municipality updated their current Asset Register during the 2014/2015 financial year. The tables below give an overview of Beaufort West Municipality's Water and Sewerage assets as included in the Municipality's Asset Register on the 30th of June 2015, as received from the Finance Department.

Water Infrastructure: The current and depreciated replacement cost of the water infrastructure of Beaufort West Municipality, as included in their Asset Register, is summarised in the table below:

Table C.6.1: Current and depreciated replacement cost of the water infrastructure

Asset Type	CRC	DRC	% DRC/CRC
Bulk Supply	R35 175 553	R16 343 697	46.5%
Bulk Water Pipelines	R62 296 802	R32 025 575	51.4%
Borehole	R1 055 905	R0	0.0%
Consumer Connections	R1 894 354	R863 031	45.6%
Water Pump Stations	R11 800 410	R8 102 018	68.7%
Reservoirs	R86 591 367	R22 686 756	26.2%
Water Pipeline	R80 001 746	R42 080 684	52.6%
WTW Beaufort West (WTW-001)	R10 476 729	R6 017 949	57.4%
WTW Nelspoort (WTW-002)	R1 469 488	R311 831	21.2%
WTW Nelspoort (WTW-003)	R1 079 592	R219 172	20.3%
WTW Merweville (WTW-004)	R147 968	R78 916	53.3%
Totals	R291 989 915	R128 729 629	44.1%

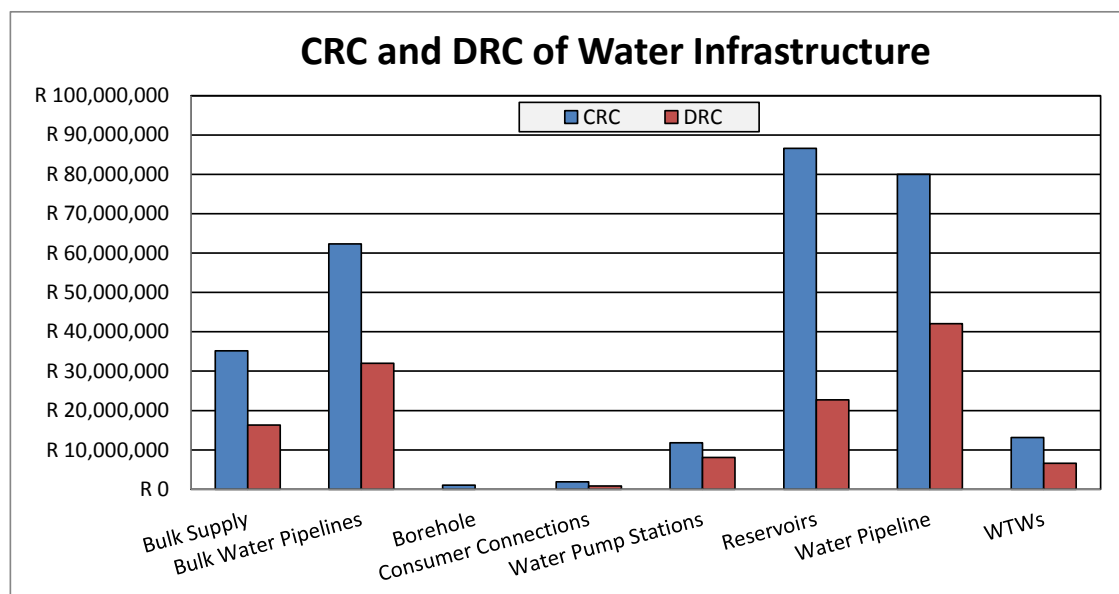


Figure C.6.1: CRC and DRC of the Water Infrastructure

The above table means that 55.91% of the value of the water infrastructure has been consumed.

The following table gives an overview of the remaining useful life and the age distribution by facility type for the water infrastructure (CRC):

Table C.6.2: Overview of the remaining useful life and age distribution by facility type for the water infrastructure (CRC)					
Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
RUL					
Bulk Supply	R8 844 484	R2 933 577	R3 086 987	R2 997 705	R17 312 799
Bulk Water Pipelines	R0	R15 576 848	R0	R1 472 000	R45 247 955
Borehole	R0	R0	R598 222	R0	R457 683
Consumer Connections	R0	R686 000	R1 027 710	R0	R180 644
Water Pump Stations	R3 496 758	R7 338 850	R0	R0	R964 802
Reservoirs	R61 255 438	R1 731 492	R0	R80 000	R23 524 438
Water Pipeline	R10 104 083	R0	R737 996	R0	R69 159 667
WTW Beaufort West (WTW-001)	R1 800 152	R288 880	R40 000	R30 000	R8 317 697
WTW Nelspoort (WTW-002)	R1 429 488	R0	R0	R40 000	R0
WTW Nelspoort (WTW-003)	R939 592	R0	R100 000	R40 000	R0
WTW Merweville (WTW-004)	R147 968	R0	R0	R0	R0
Totals	R88 017 964	R28 555 647	R5 590 916	R4 659 705	R165 165 684
Age distribution by Facility Type					
Bulk Supply	R8 774 924	R933 325	R2 379 527	R3 342 432	R19 745 346
Bulk Water Pipelines	R3 495 623	R132 800	R4 442 751	R8 819 794	R45 405 835
Borehole	R1 055 905	R0	R0	R0	R0
Consumer Connections	R1 894 354	R0	R0	R0	R0
Water Pump Stations	R6 784 490	R1 680 956	R1 510 225	R1 002 674	R822 065
Reservoirs	R965 564	R117 500	R0	R11 700	R85 496 603
Water Pipeline	R4 232 121	R13 195 430	R5 403 931	R1 315 734	R55 854 530
WTW Beaufort West (WTW-001)	R1 302 534	R4 520 000	R674 291	R1 445 861	R2 534 043
WTW Nelspoort (WTW-002)	R0	R67 000	R0	R0	R1 402 488
WTW Nelspoort (WTW-003)	R0	R214 592	R85 000	R100 000	R680 000
WTW Merweville (WTW-004)	R0	R0	R147 968	R0	R0
Totals	R28 505 514	R20 861 603	R14 643 693	R16 038 194	R211 940 910

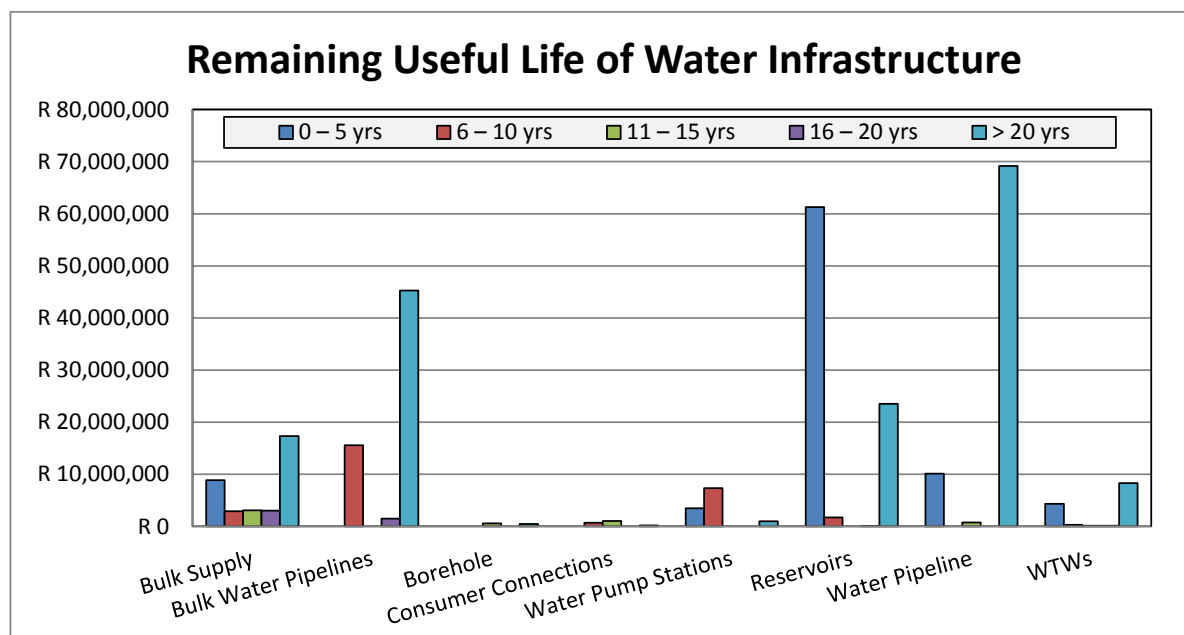


Figure C.6.2: Remaining Useful Life of the Water Infrastructure

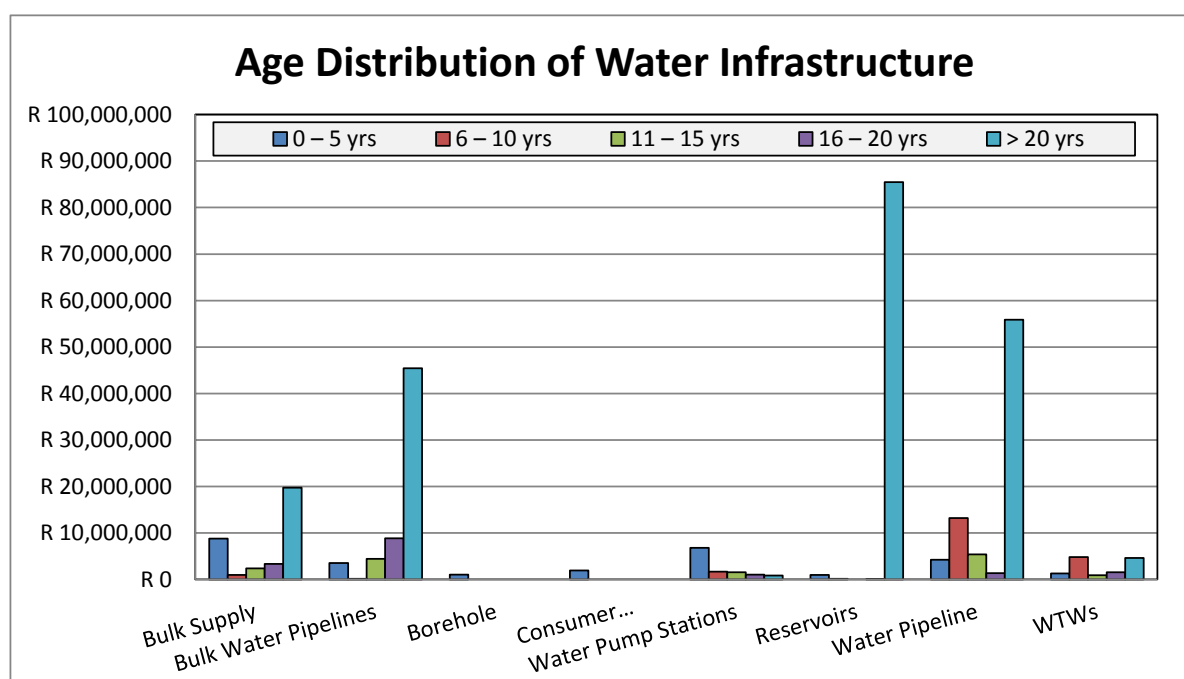


Figure C.6.3: Age distribution of the Water Infrastructure

The average water asset renewal needs over the next 10 years is R11.66 million per year and the reinvestment required is R88.018 million in the first 5 years and R28.556 million in the second 5 year period.



The condition grading per water facility type is summarised in the table below:

Asset Type	Very Good	Good	Fair	Poor	Very Poor
Bulk Supply	R11 004 119	R3 846 476	R5 763 651	R13 654 662	R906 646
Bulk Water Pipelines	R12 555 760	R29 917 214	R4 246 980	R0	R15 576 848
Borehole	R1 055 905	R0	R0	R0	R0
Consumer Connections	R1 894 354	R0	R0	R0	R0
Water Pump Stations	R8 465 446	R0	R1 648 160	R1 344 739	R342 065
Reservoirs	R982 064	R20 971 759	R3 398 606	R61 238 938	R0
Water Pipeline	R24 147 216	R13 404 341	R32 346 106	R10 104 083	R0
WTW Beaufort West (WTW-001)	R5 822 534	R2 331 455	R607 999	R1 614 741	R100 000
WTW Nelspoort (WTW-002)	R27 000	R0	R40 000	R1 402 488	R0
WTW Nelspoort (WTW-003)	R174 592	R0	R135 000	R110 000	R660 000
WTW Merweville (WTW-004)	R0	R147 968	R0	R0	R0
Totals	R66 128 989	R70 619 214	R48 186 503	R89 469 650	R17 585 559

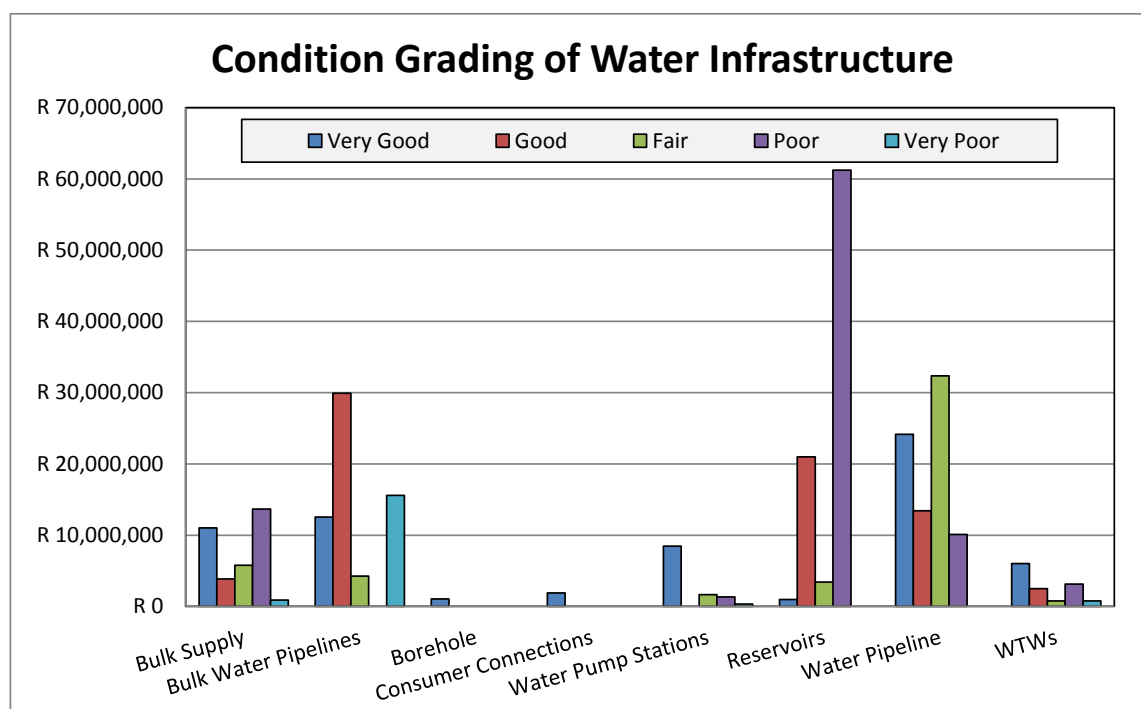


Figure C.6.4: Condition grading of water infrastructure

About 36.7% of the water supply infrastructure is in a poor or very poor condition and the condition backlog is in the order of R107.1 million. The bulk of the backlog is made up of bulk water pipeline, water reticulation pipeline and reservoir assets.



The risk category of all the “poor” and “very poor” assets per water facility are summarised in the table below:

Table C.6.4: Risk category of all the poor and very poor assets per water facility type				
Asset Type	Significant	High	Moderate	Low
Bulk Supply	R2 405 229	R1 071 646	R11 084 433	R0
Bulk Water Pipelines	R0	R15 576 848	R0	R0
Borehole	R0	R0	R0	R0
Consumer Connections	R0	R0	R0	R0
Water Pump Stations	R342 065	R948 674	R396 065	R0
Reservoirs	R5 743 982	R0	R55 494 956	R0
Water Pipeline	R4 799 086	R0	R5 304 997	R0
WTW Beaufort West (WTW-001)	R250 000	R100 000	R1 364 741	R0
WTW Nelspoort (WTW-002)	R0	R0	R1 402 488	R0
WTW Nelspoort (WTW-003)	R560 000	R100 000	R110 000	R0
WTW Merweville (WTW-004)	R0	R0	R0	R0
Totals	R14 100 362	R17 797 168	R75 157 679	R0

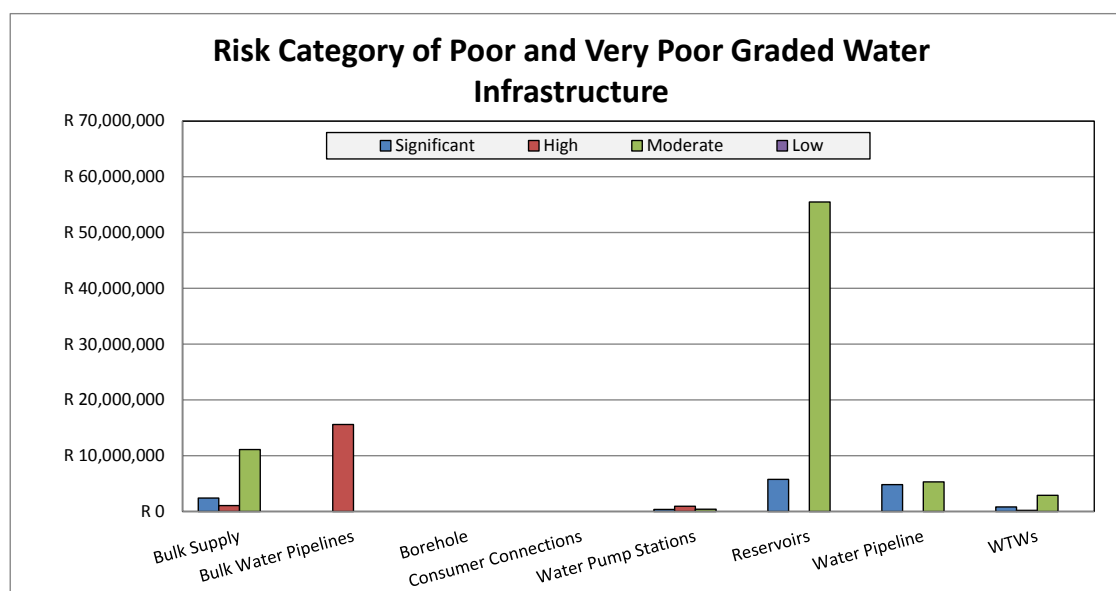


Figure C.6.5: Risk rating of poor and very poor graded water infrastructure

Sewerage Infrastructure: The current and depreciated replacement cost of the sewerage infrastructure of Beaufort West Municipality is summarised in the table below:

Table C.6.5: Current and depreciated replacement cost of the sewerage infrastructure			
Asset Type	CRC	DRC	% DRC/CRC
Bulk Sewer Pipelines	R258 630	R250 009	96.7%
Sewer Pump Stations	R4 384 889	R1 029 442	23.5%
Sewer Pipelines	R5 249 610	R2 839 249	54.1%
Sewer Reticulation Pipelines	R75 385 560	R40 667 374	53.9%
Reclamation Plant (STW-01)	R24 344 308	R23 471 933	96.4%
Beaufort West WWTW (STW-001)	R18 064 619	R5 526 926	30.6%
Nelspoort WWTW (STW-002)	R431 378	R222 061	51.5%
Merweville WWTW (STW-03)	R2 008 015	R1 816 450	90.5%
Totals	R130 127 009	R75 823 444	58.3%

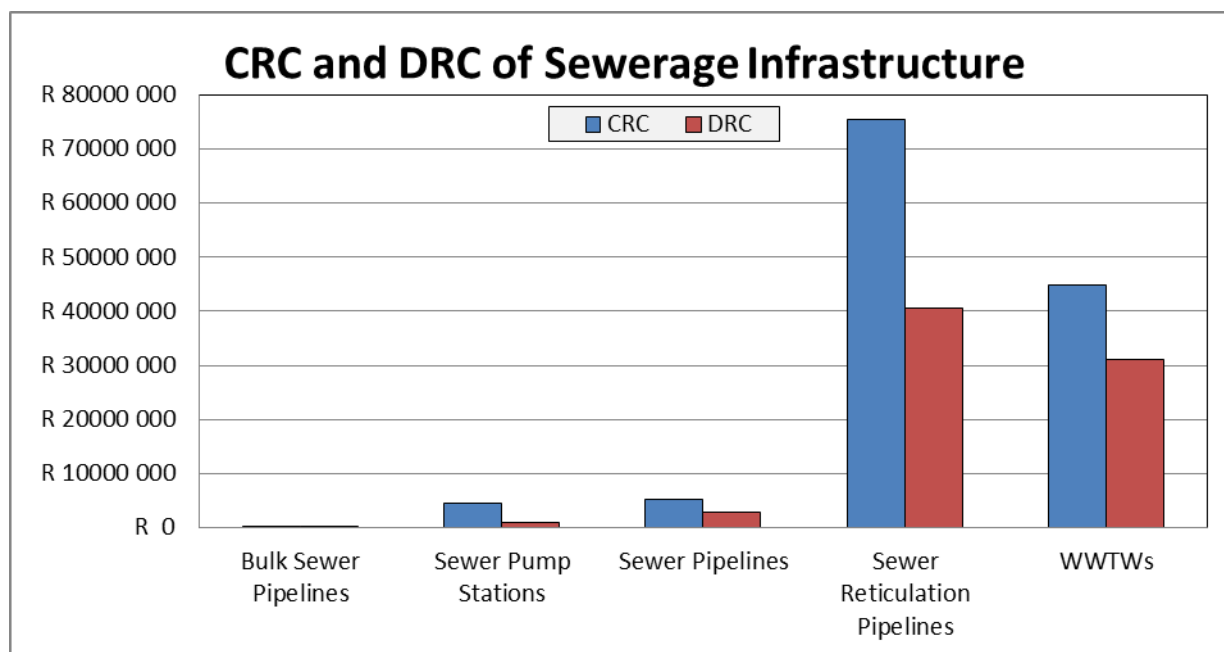


Figure C.6.6: CRC and DRC of the Sewerage Infrastructure

The above table means that 41.7% of the value of the sewerage infrastructure has been consumed.

The following table gives an overview of the remaining useful life and the age distribution by facility type for the sewerage infrastructure (CRC):

Table C.6.6: Overview of the remaining useful life and age distribution by facility type for the sewerage infrastructure (CRC)					
Asset Type	0 – 5 yrs	6 – 10 yrs	11 – 15 yrs	16 – 20 yrs	> 20 yrs
RUL					
Bulk Sewer Pipelines	R0	R0	R 0	R 0	R 258 630
Sewer Pump Stations	R2 499 338	R73 348	R 571 744	R 75 000	R 1 165 459
Sewer Pipelines	R0	R0	R 0	R 0	R 5 249 610
Sewer Reticulation Pipelines	R0	R0	R 0	R 0	R 75 385 560
Reclamation Plant (STW-01)	R0	R0	R 0	R 10 980 093	R 13 364 215
Beaufort West WWTW (STW-001)	R5 076 115	R165 950	R 763 163	R 498 750	R 11 560 641
Nelspoort WWTW (STW-002)	R90 000	R0	R 341 378	R 0	R 0
Merweville WWTW (STW-03)	R125 000	R35 110	R 495 530	R 17 351	R 1 335 024
Totals	R7 790 453	R274 408	R 2 171 815	R 11 571 194	R 108 319 138
Age distribution by Facility Type					
Bulk Sewer Pipelines	R258 630	R0	R0	R0	R0
Sewer Pump Stations	R1 557 203	R610 228	R1 492 414	R586 044	R139 000
Sewer Pipelines	R5 249 610	R0	R0	R0	R0
Sewer Reticulation Pipelines	R2 371 393	R11 855 742	R5 768 063	R2 369 572	R53 020 790
Reclamation Plant (STW-01)	R24 344 308	R0	R0	R0	R0
Beaufort West WWTW (STW-001)	R878 163	R2 114 935	R0	R0	R15 071 521
Nelspoort WWTW (STW-002)	R0	R149 778	R0	R0	R281 600
Merweville WWTW (STW-03)	R1 802 146	R0	R205 870	R0	R0
Totals	R36 461 452	R14 730 683	R7 466 346	R2 955 616	R68 512 911

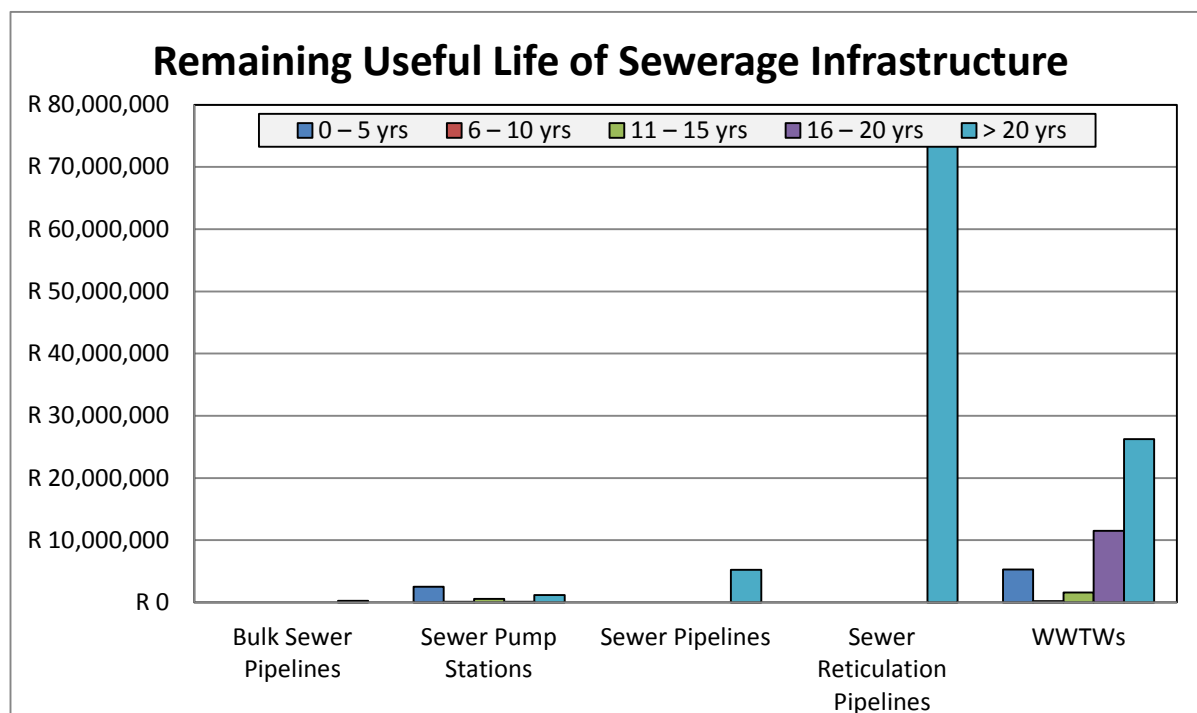


Figure C6.7: Remaining Useful Life of the sewerage Infrastructure

The asset renewal needs for the sewerage infrastructure assets over the next 10 years is R0.806 million per year. The reinvestment required is R7.790 million in the first 5 years and R0.274 million in the second 5 year period. The age of 52.7% of the sewerage infrastructure assets is greater than 20 years.

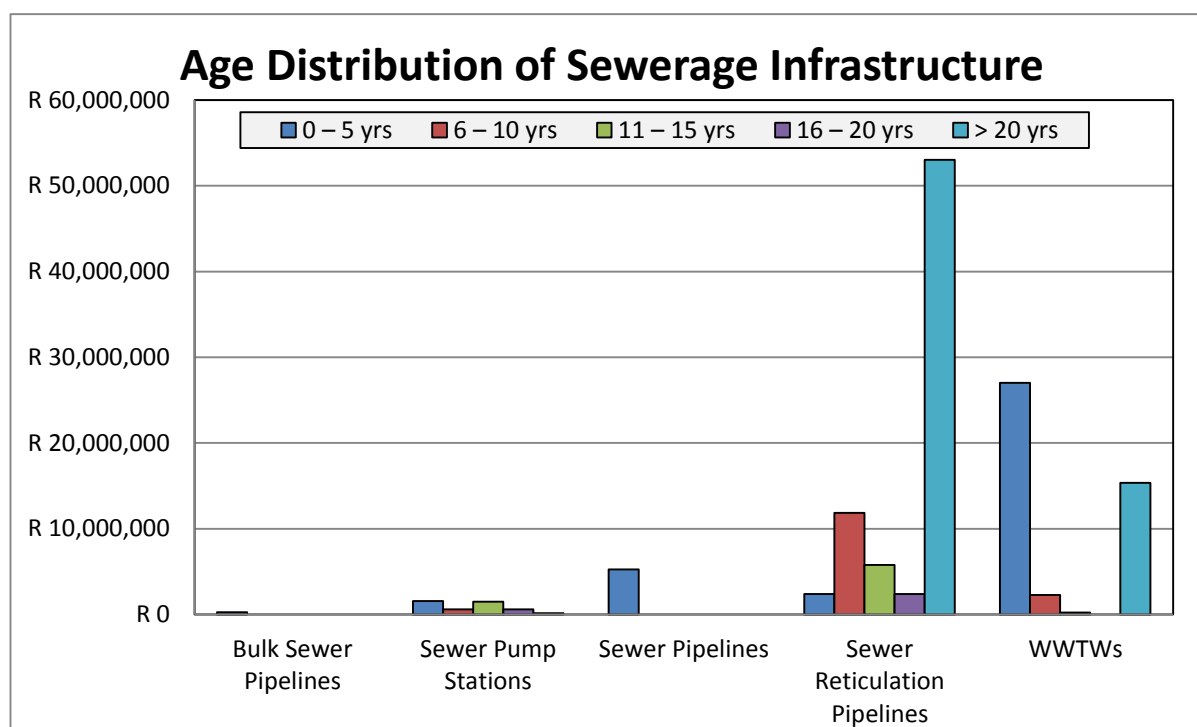


Figure C.6.8: Age distribution of the sewerage Infrastructure



The condition grading per sewerage facility type is summarised in the table below:

Table C.6.7: Condition grading per sewerage facility type					
Asset Type	Very Good	Good	Fair	Poor	Very Poor
Bulk Sewer Pipelines	R258 630	R0	R0	R0	R0
Sewer Pump Stations	R1 557 203	R1 409 870	R812 076	R455 044	R150 696
Sewer Pipelines	R5 249 610	R0	R0	R0	R0
Sewer Reticulation Pipelines	R20 460 971	R11 812 711	R36 690 820	R6 421 057	R0
Reclamation Plant (STW-01)	R24 344 308	R0	R0	R0	R0
Beaufort West WWTW (STW-001)	R1 420 538	R592 702	R13 945 522	R1 155 727	R950 130
Nelspoort WWTW (STW-002)	R59 778	R90 000	R281 600	R0	R0
Merweville WWTW (STW-03)	R1 796 615	R0	R211 400	R0	R0
Totals	R55 147 654	R13 905 283	R51 941 418	R8 031 828	R1 100 826

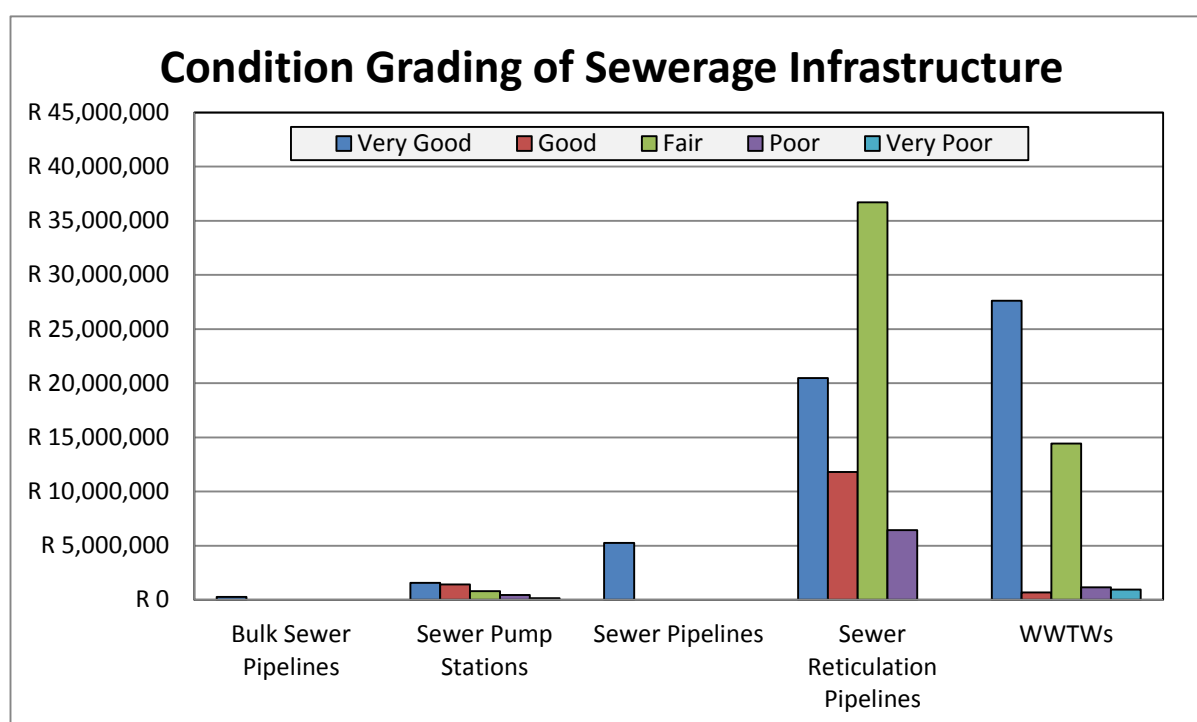


Figure C.6.9: Condition grading of sewerage Infrastructure

About 7.0% of the sewerage infrastructure is in a poor or very poor condition and the condition backlog is in the order of R9.133 million. The bulk of the backlog is made up of the sewer drainage networks.



The risk category of all the “poor” and “very poor” assets per sewer facility are summarised in the table below:

Table C.6.8: Risk category of all the poor and very poor assets per sewer facility type				
Asset Type	Significant	High	Moderate	Low
Bulk Sewer Pipelines	R0	R0	R0	R0
Sewer Pump Stations	R146 696	R0	R459 044	R0
Sewer Pipelines	R0	R0	R0	R0
Sewer Reticulation Pipelines	R0	R0	R6 421 057	R0
Reclamation Plant (STW-01)	R0	R0	R0	R0
Beaufort West WWTW (STW-001)	R950 130	R0	R1 155 727	R0
Nelspoort WWTW (STW-002)	R0	R0	R0	R0
Merweville WWTW (STW-03)	R0	R0	R0	R0
Totals	R1 096 826	R0	R8 035 828	R0

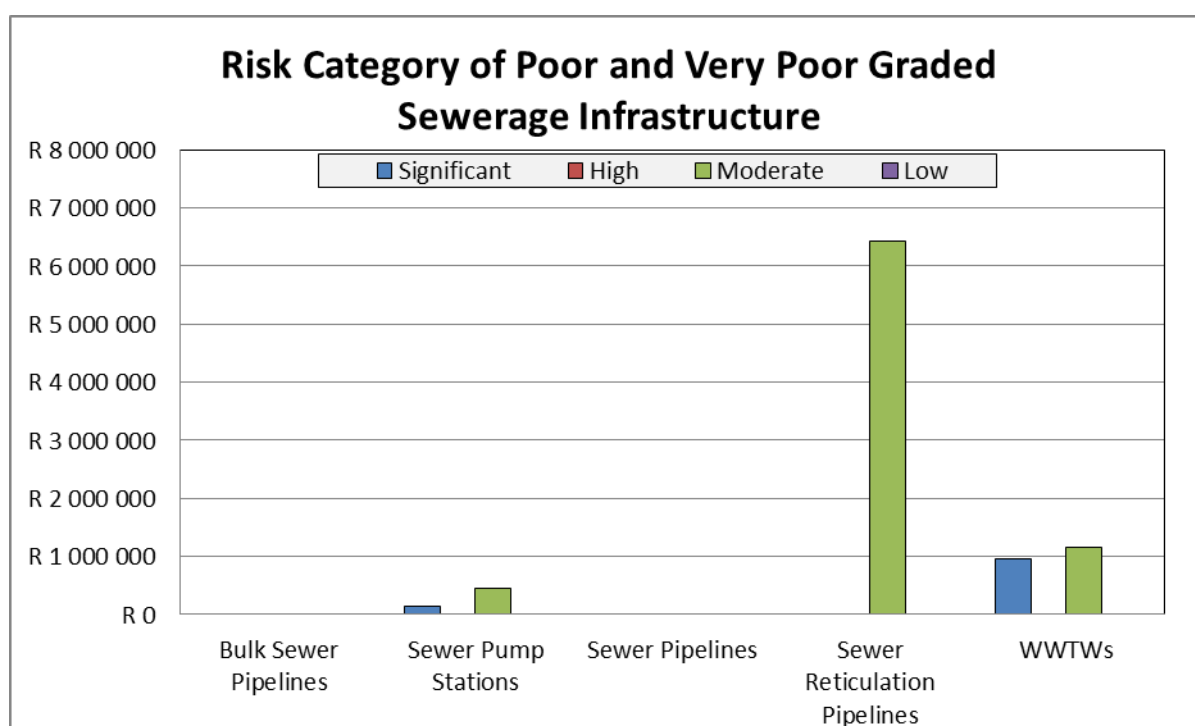


Figure C.6.10: Risk category of poor and very poor graded sewerage infrastructure



C.7. Associated Services

All the schools in Beaufort West Municipality's Management Area are provided with adequate water and sanitation services. The existing water and sanitation service levels for all the Schools and Tertiary Education Facilities in the Beaufort West Municipality's Management Area is summarised in the table below.

Table C.7.1: Service Levels at Schools in Beaufort West Municipality's Management Area							
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	21	21	0	0	21	0	0
Tertiary Education Facility	2	2	0	0	2	0	0

Beaufort West Municipality experiences a general increase in the dependency on and need for public health care which represents a huge challenge and requires major resources. The existing water and sanitation service levels for all the Medical Facilities in Beaufort West Municipality's Management Area is summarised in the table below.

Table C.7.2: Service Levels at Medical Facilities in Beaufort West Municipality's Management Area							
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
Hospitals	2	2	0	0	2	0	0
Health Centres *	4	4	0	0	4	0	0
Clinics	5	5	0	0	5	0	0
Satelite Clinics	1	1	0	0	1	0	0

Note: * Health Centres include Private Medical Facilities

C.8. Water Resources

Water balance models were developed for each of the towns within Beaufort West Municipality's Management Area, except Murraysburg, and are included in Annexure A. Graphs of the total water requirement (bulk raw water, system input volume and billed metered consumption), peak month factors, annual non-revenue water per system and water usage per sector are included in Annexure A.

All the surface and groundwater sources are all supplied with bulk water meters, which are read weekly by the Beaufort West Municipality's personnel and is a valuable source of information in terms of the water balances for the various distribution systems.

Beaufort West – The town is supplied with surface water from the Gamka Dam, groundwater from various production boreholes and potable water from the Beaufort West Reclamation Plant, where secondary treated water from the Beaufort West WWTW is further treated to potable standards.



The graph below gives an overview of the annual raw water supply to Beaufort West from the various water resources.

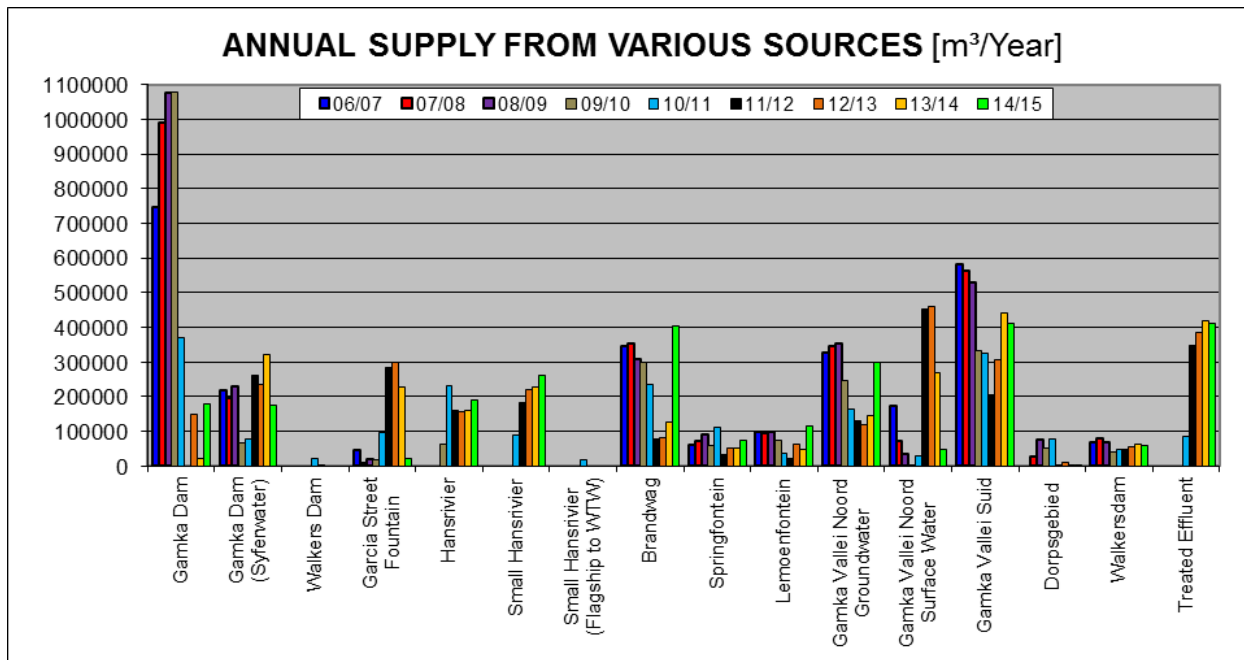


Figure C.8.1: Annual raw water supply to Beaufort West from the various resources.

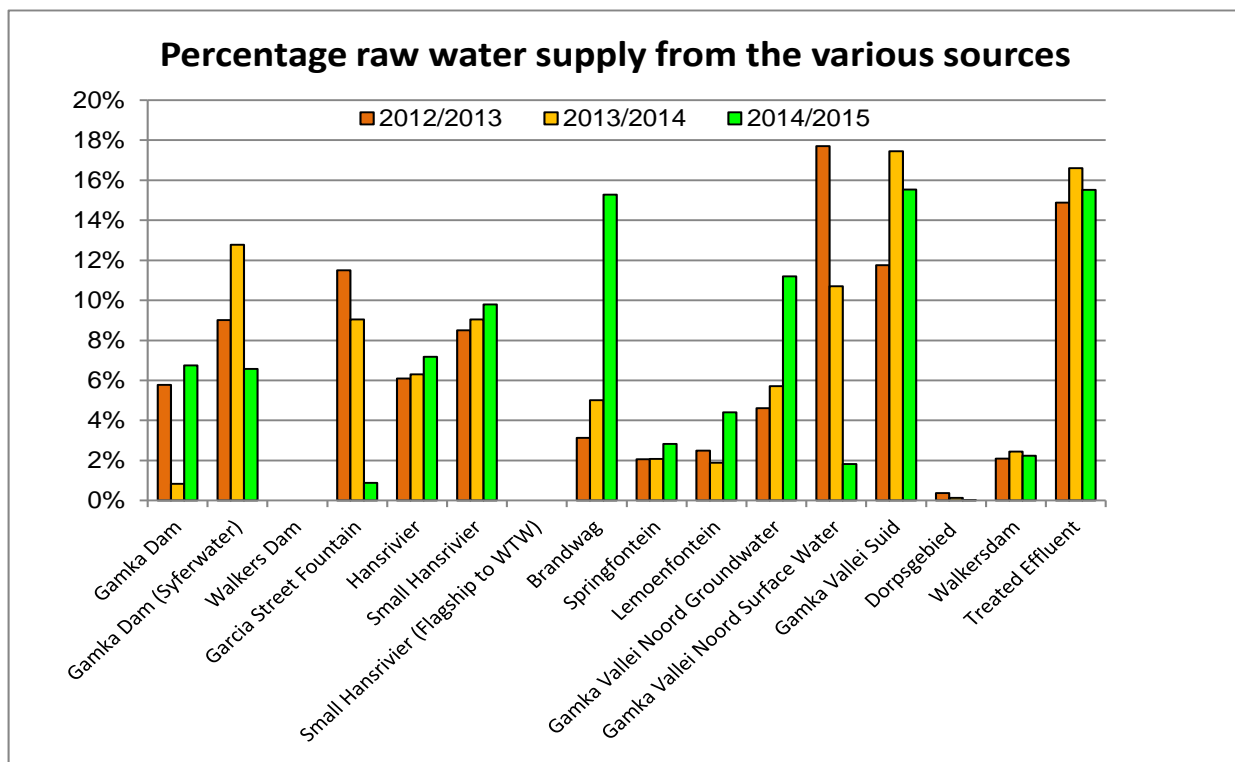


Figure C.8.2: Percentage raw water supply to Beaufort West from the various resources for the last three financial years.



Beaufort West Municipality experienced serious problems with drought conditions during 2009-2011 impacting on the security of water supply to its consumers. The drought period has seen the water levels in the major surface water source of Beaufort West, the Gamka Dam, reduced to such low levels that the uninterrupted supply of drinking water to the town was not a certainty. The borehole scheme serves to augment the surface water, but could not supply sufficient quantities of water on its own. The lack of water in the Gamka Dam over the last few years, brought on by severe drought conditions in the catchment area of the Gamka Dam, has placed a lot of pressure on the groundwater sources which are inadequate to supply in Beaufort West's water requirements in the absence of surface water supply from the Gamka Dam.

A water reclamation project, where secondary treated water from the Beaufort West WWTW is further treated (in a new reverse osmosis based treatment plant) to a high quality and mixed with the treated water from the WTW, was commissioned on the 15th of January 2011 to further supplement the existing raw water supply. The additional supply from the reclamation plant for 2014/2015 was 412 MI (15.5% of Beaufort West's total raw water requirement).

Merweville – Groundwater supply to the town is from seven production boreholes.

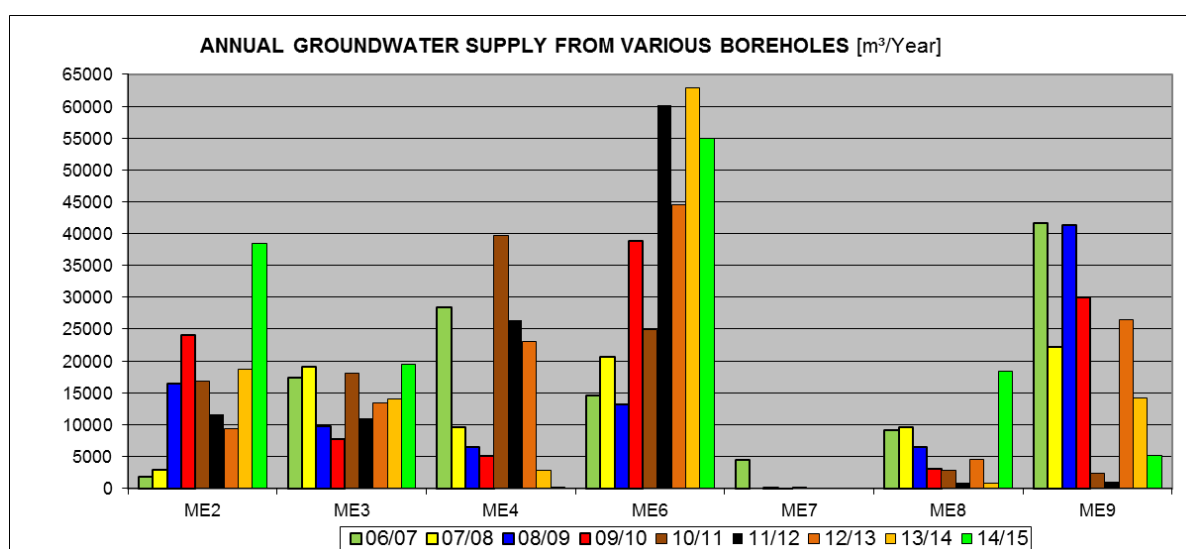


Figure C.8.3: Annual groundwater supply to Merweville from the various boreholes.

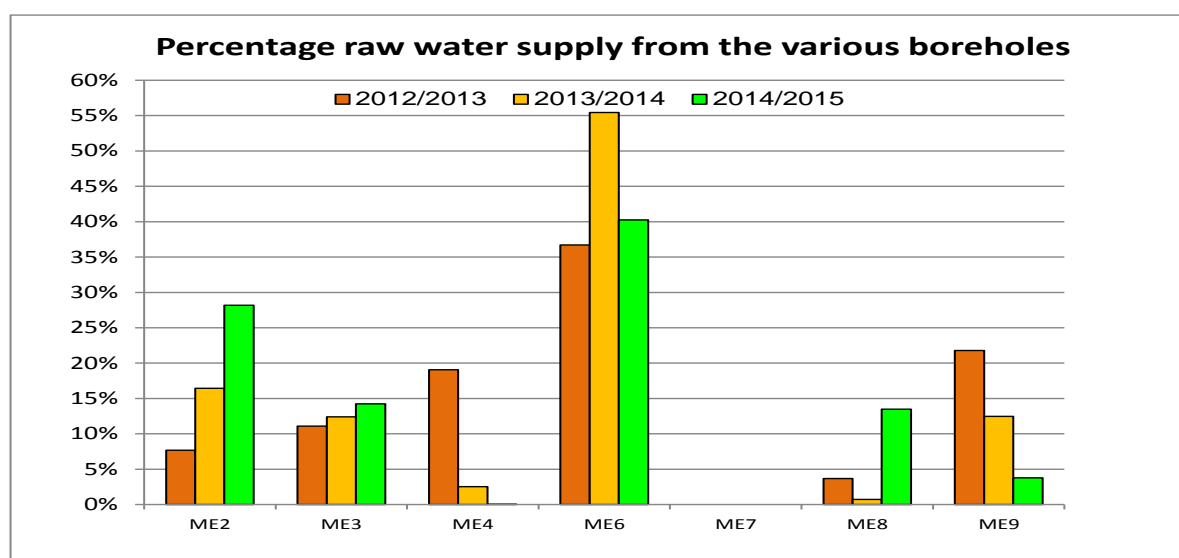


Figure C.8.4: Percentage raw water supply to Merweville from the various boreholes for the last three financial years.



Nelspoort – The town is supplied with surface water from the Sout River and groundwater from two production boreholes. One new production borehole was drilled during 2009/2010 and the Municipality is currently busy to incorporate this borehole into the network.

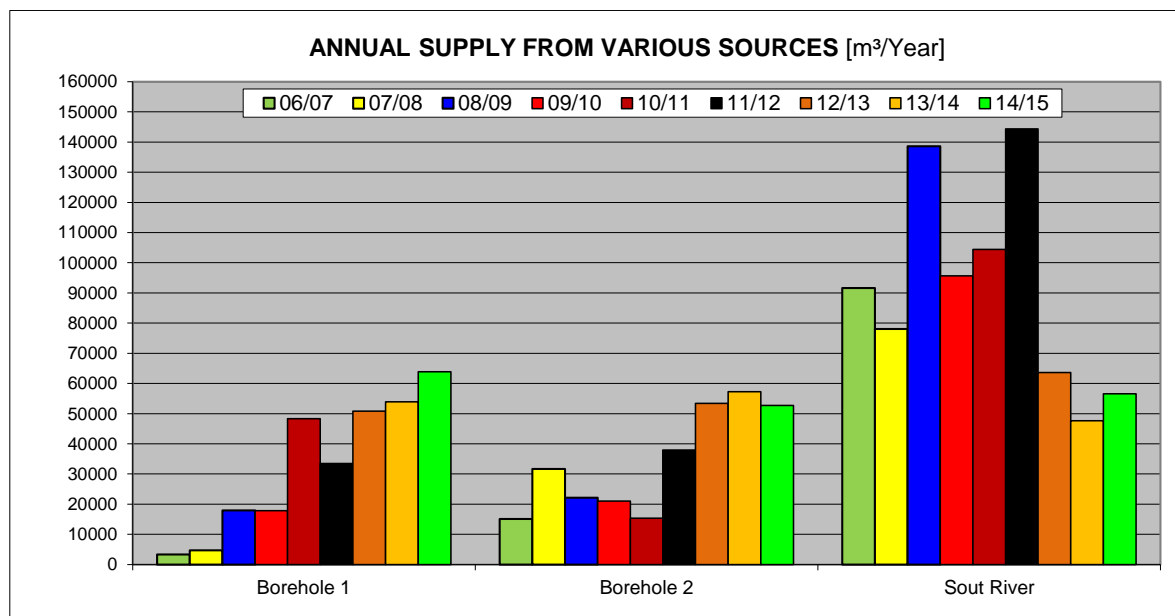


Figure C8.5: Annual raw water supply to Nelspoort from the various resources.

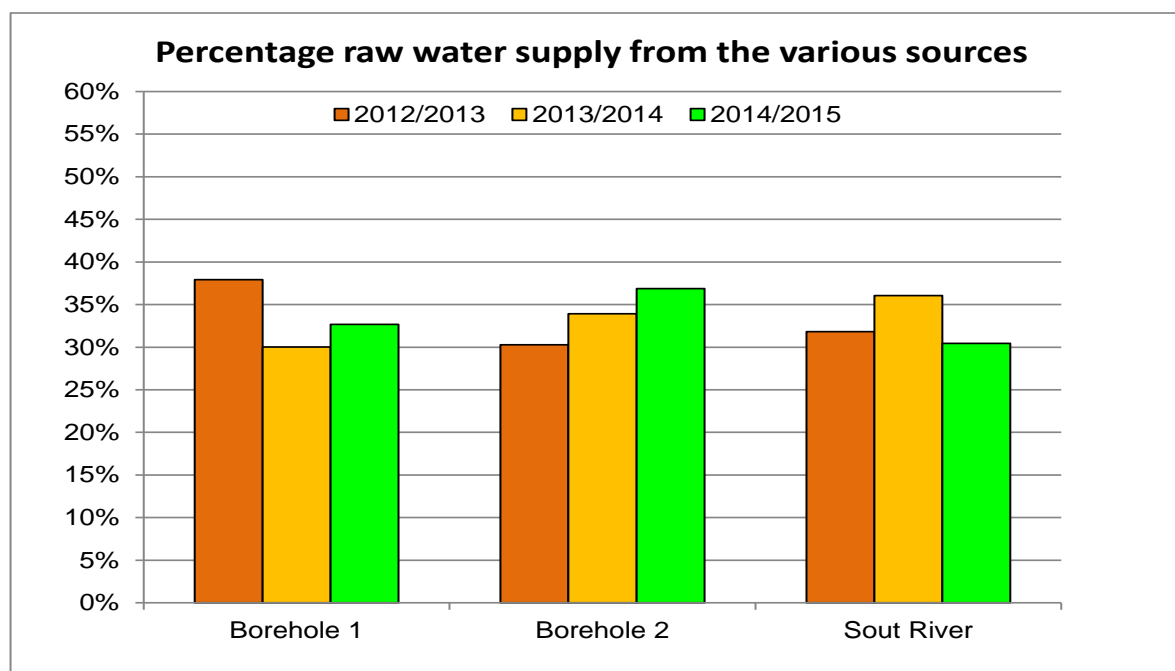


Figure C.8.6: Percentage raw water supply to Nelspoort from the various resources for the last three financial years.

The drought conditions also impacted on the drinking water supply to Nelspoort, with the surface water abstracted from the weir drying up in the summer months, and the town relying on borehole water to sustain the water feed to the WTW.



The existing water sources in Beaufort West and Nelspoort are therefore under constant pressure to meet the future water requirements and further exploitation of additional groundwater resources is taking place.

GEOSS was tasked to conduct several hydrogeological investigations to identify areas where additional groundwater could be sourced for Beaufort West town supply. A water balance study carried out by GEOSS during 2007 estimated that the current municipal well fields of Beaufort West are already over utilised and that no additional groundwater is available for further development. The latter resulted in a wider regional hydrogeological assessment that could possibly identify new areas for groundwater development.

The reliance on groundwater supply for the towns of Beaufort West, Merweville and Nelspoort highlights the need for Beaufort West Municipality to keep on focussing on aquifer protection, groundwater monitoring and well-field management. Additional water sources need to be identified for Beaufort West and Nelspoort to enable the towns to meet its water demand particularly in times of low groundwater recharge.

Based on the investigations conducted by GEOSS the following were recommended in their *"A Regional reconnaissance investigation to identify areas for groundwater development in Beaufort West, May 2007"* Report:

- Proceed with the utilisation of Brandwag 5. Brandwag 5 must be pumped at a maximum yield of 2.0 l/s for 12 hours – short term option **(Was started by Beaufort West Municipality in November 2007)**.
- Conduct a monthly water quality monitoring programme together with the routine monthly water level monitoring– short term option **(Implemented by Beaufort West Municipality)**.
- Re-drill a new borehole next to G29877L; Pump test the newly drilled borehole and scientifically assess its groundwater potential; Assess the Droërvier area to determine whether there are any existing boreholes that can be used for augmentation; Depending on the outcome of the assessment, decide to site and drill additional boreholes here – short term option **(Implemented by Beaufort West Municipality)**.
- Conduct a groundwater exploration programme to source additional groundwater in sub areas D, B, C and A in order of priority – medium term option **(Busy with implementation)**.
- Consider the desalinisation of treated sewage water – medium term option **(Implemented by Beaufort West Municipality)**.
- Investigate future desalinisation options in the eastern parts of the Hans River cadastral farm property – medium term option **(Implemented by Beaufort West Municipality)**.
- Investigate future desalinisation options in the Lower Plaatdoorns area – long term option.

In essence, the Beaufort West water supply is in a dire situation. The groundwater levels in the vicinity of production boreholes are dropping by an average of 1m per year. This is due to a combination of over-abstraction and reduced groundwater recharge. Over the past eight years the rainfall has been below the long term average (267mm/a) for seven of those years. The groundwater from the town wellfield is the best of all the wellfields, yet it is the most prone to contamination from anthropogenic sources.

In October 2011, GEOSS completed a hydrocensus as the first step in the medium to long term groundwater development for the town of Beaufort West. The hydrocensus targeted three areas (Target Area 1, 2 and 3) and found the most favorable target area to be Target Area 3, an area south of the town including the farms Steenrotsfontein and Lombaard's Kraal. Target Area 3 was identified as the most favorable target area based on its proximity to the town, the relatively high groundwater potential and the support of the two farmers concerned (namely Natie Nel and Ian Taylor). Numerous boreholes exist in this area, as well as undeveloped land with the potential for geophysical groundwater exploration. Target Area 3 was therefore targeted first, with Target Areas 1 (Renosterkop) and 2 (along the south western border of the Karoo National Park) possibly targeted at a later stage, depending on obtained results and available budget.



The recommendations and considerations included in the GEOSS's *Hydrocensus Report (26 October 2011)* pertaining to the further development of groundwater resources, were as follows:

- It is of paramount importance that permissions are put in place prior to commencing groundwater exploration and development on the farmer's land.
- There are two springs in the area identified for groundwater exploration; these reportedly did not dry up during the previous year's dry summer months. There are groundwater dependant ecosystems linked to these springs and Ian Taylor stated that animals drink at the spring on his farm during the dry water scarce periods. For this reason it is important that monitoring of these springs takes place prior to borehole drilling and abstraction. This will enable an evaluation of whether borehole abstraction does impact the springs in the case that this accusation is made in the future. Any drilling of boreholes must also not result in any surface-based contamination affecting these springs and best practice drilling measures must be implemented.
- Geophysics should be conducted in order to identify suitable drilling targets for boreholes at the identified land in Target Area 3. Once the driller has been appointed these borehole sites can be drilled.
- Existing boreholes on the relevant farmer's land that have been identified as possible municipal supply boreholes can be tested for yield and quality.
- Dependant on the success of the groundwater exploration and development at Target Area 3 and available budget other target areas can be considered. Target Area 2, despite being located relatively far from Beaufort West and having numerous farmers opposed to municipal abstraction, appears to offer some targets for groundwater exploration. Borehole sitings can take place along the road if permission from land owners is a problem.
- The high yielding borehole at Renosterkop can be considered for Municipal supply should the problems related to the very poor water quality be dealt with. Wallie Nigrini, the land owner, has stated that he is prepared to make this borehole's water available to Beaufort West. This borehole must be pump tested.
- In addition to developing more groundwater resources it is advised that Beaufort West Municipality considers managed or artificial recharge to increase the groundwater storage. The dropping water levels observed over the past few years at the wellfields, and in particularly Brandwag, are disconcerting and need to be addressed. Artificial recharge has been successfully implemented in other South African low rainfall areas. The means of artificial and managed recharge can vary but the concept is relatively simple and involves using water in times of water surplus (as recently experienced in Beaufort West) to recharge aquifers thereby increasing their storage prior to the low rainfall periods.

Following on from the recommendations of the Hydrocensus Report, GEOSS was appointed to conduct borehole drilling and testing at locations sited based on the hydrocensus and geophysics. A total of nine boreholes were drilled, and a total of 11 boreholes (newly drilled and existing) were identified for yield testing. With the exception of borehole RK1 (Target Area 1) all the drilled and tested boreholes are located in Target Area 3. Of the 11 boreholes identified for testing, only 4 boreholes had sufficiently high yields and sufficient recovery to be utilised. In addition to these, there are an additional 2 existing boreholes in the Target Area 3 which have been tested previously (GEOSS, 2011) and can be utilised as a groundwater source.



The six (6) future production boreholes are indicated in the table below.

Table C.8.1: Further potential production boreholes drilled in Beaufort West				
New Production Boreholes	Recommended yield (l/s)	Pump duration (Hrs)	EC (mS/m)	Comment
RK1	4.6	16	445	Borehole quality quite poor. High yielding
SR5	4.5	16	285	High yielding borehole
SR4	4.5	16	253	High yielding borehole
SR9	2	16	240	Good recovery
QA2	3	16	83	Existing borehole (GEOSS, 2011)
SR10	5	16	182	Existing borehole (GEOSS, 2011)

The recommendations and considerations included in GEOSS's "*Medium and Long Term Groundwater Development for Beaufort West, 20 June 2012*" Report, are as follows:

- 6 Boreholes can be equipped and utilised at the recommended rate pumping of 16 hours per day and resting for 8 hours per day.
- The groundwater is very hard and should preferably be treated prior to use. Borehole RK1 has a poor water quality and would definitely require some form of treatment prior to municipal use.
- In addition to developing more groundwater resources it is advised that Beaufort West Municipality considers managed or artificial recharge to increase the groundwater storage. The dropping water levels observed over the past few years at the wellfields, and in particularly Brandwag, are disconcerting and need to be addressed. Artificial recharge has been successfully implemented in other South African low rainfall areas. The means of artificial and managed recharge can vary but the concept is relatively simple and involves using water in times of water surplus (as recently experienced in Beaufort West) to recharge aquifers thereby increasing their storage prior to the low rainfall periods.
- While some geophysics was carried out at Target Area 2, the lack of support from the farmers and access restrictions limited the study. Further investigations and exploration can be done in this area if permissions are obtained from local land owners.

Murraysburg:

GEOSS was also appointed to analyse yield test and chemistry data for two boreholes at Murraysburg. Park_BH1 is an existing borehole at the Park and Rugby_BH3a is a re-drilled borehole at the rugby fields, drilled a few meters from the existing blocked borehole, Rugby_BH3. The results of the pumping test analysis are summarised in the table below.

Table C.8.2: Pumping test results for two boreholes tested in Murraysburg		
Borehole	Recommended yield (l/s)	Pump duration (Hrs)
Park_BH1	1.5	16
Rugby_BH3a	3.8	16

A complete geohydrological exploration with geophysics should be completed if additional groundwater resources are to be developed in Murraysburg.



The table below gives an overview of the years in which the annual water requirement is likely to exceed the safe yields from the various resources.

Table C.8.3: Years in which the annual water demand will exceed the sustainable yield from the various resources				
Distribution System	Total sustainable Yield (x 10 ⁶ m ³ /a)	Annual Growth on 2012/2013 Demand (1.5% or 3.5%)	Annual Growth on 2012/2013 Demand (3.5% or 5.5%)	WSDP Projection Model
Beaufort West (Incl. Hansrivier and Small Hansrivier)	3.192	2022 (2%)	2018 (3.5%)	2036
Merweville	0.322	> 2037 (1%)	> 2037 (2%)	> 2037
Nelspoort (Incl. Weir borehole)	0.412	> 2037 (1%)	> 2037 (2%)	> 2037
Murraysburg (Incl. MB Rugby Bh3 & MB Hostel Bh4)	0.198	Future Water Demand Projection Model not yet in place		

The DWS also updated their 2010/2011 All Towns Reconciliation Strategies during 2015 and the table below gives an overview of the recommended potential future water resources as included in the updated All Towns Reconciliation Strategies of Beaufort West Municipality:

Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	Option	Potential
Beaufort West	Re-use of water	<ul style="list-style-type: none"> The reclamation plant is fully operational and the Municipality continue to use the plant on a daily basis. The re-use of the treated effluent is therefore a suitable resource for Beaufort West. The hydraulic capacity of the reclamation plant is currently 1.210 Ml/day and the Municipality will continue to upgrade the capacity at 10% per year up to 2.100 Ml/day.
	Groundwater	Continue with the development of the following six future production boreholes: <ul style="list-style-type: none"> RK1: Recommended yield 4.6 l/s (water quality quite poor, high yield) SR5: Recommended yield 4.5 l/s (high yield) SR4: Recommended yield 4.5 l/s (high yield) SR9: Recommended yield 2 l/s (good recovery) QA2: Recommended yield 3 l/s (existing borehole) SR10: Recommended yield 5 l/s (existing borehole).
	Surface Water	<ul style="list-style-type: none"> The Gamka Dam is the only major dam located in close proximity to Beaufort West and it is already fully utilised.
	Other Sources	<ul style="list-style-type: none"> Rainwater harvesting is not a suitable option for the area, because the mean annual precipitation is considered too low.
	Summary	<p>The current water supply will meet the future water requirements for all growth scenarios if the implementation of the WC/WDM Strategy is successful. The following interventions are recommended for implementation, in order of priority and implementation sequence:</p> <ul style="list-style-type: none"> Full implementation of the WC/WDM Strategy. Integration of recently drilled and developed boreholes. Development and implementation of integrated operating rules for the dam, the wellfields and the reclamation scheme to possibly increase the yield of the whole system. Further incremental groundwater development.
Merweville	Re-use of water	<ul style="list-style-type: none"> The provision of treated waste water as irrigation water to nearby farm holdings and for recreational purposes is not a feasible option owing to the relatively low yield and current treatment processes at the WWTW.
	Groundwater	<ul style="list-style-type: none"> Merweville relies entirely on groundwater supplied by seven boreholes that are situated within the Abrahamskraal Formation. No future water shortfalls up to 2040 are expected. The Abrahamskraal Formation is the only geological unit that can be targeted in the region for groundwater, and hence similar yields (0.5 l/s per borehole) and water qualities (Class 2-3 due to the dominant mudstone lithology) can be expected if further boreholes are drilled for the town supply. Slightly higher yields may be present at the intersection of the river course (possible NNE-SSW orientated fracture) and the E-W orientated syncline (possible increased fracturing along the fold axis). Desalinisation of the groundwater may be required in some instances to make it potable.



Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	Option	Potential
	Surface Water	<ul style="list-style-type: none"> As the current sources are more than adequate to cater for future water requirements, additional and optional surface water sources have not been considered in detail. However the Vanderbijlskraal River could be considered as a potential source in the future when the requirement exceeds the current source supply. The Vanderbijlskraal River runs through the town but this river appears to be non-perennial and direct abstraction throughout the year will not be an option. It may, however, be possible to abstract water from the Vanderbijlskraal River in the summer months when the river is flowing, store this water and subsequently use this to recharge the boreholes on which Merweville relies. The quality of water in the river is unknown and therefore pre-treatment may be required.
	Other Sources	<ul style="list-style-type: none"> Rainwater harvesting is not a suitable option for Merweville, considering the low MAP of the area.
	Summary	<p>The yields from the existing groundwater resources are adequate to meet the future growth scenarios. The existing water losses and NRW for the town are however extremely high, and there should be a major drive to reduce the existing losses. The following interventions are recommended for implementation, in order of priority and implementation sequence:</p> <ul style="list-style-type: none"> Full implementation of the WC/WDM Strategy measures. Further Groundwater development Artificial recharge of groundwater from Vanderbijlskraal River.
Nelspoort	Re-use of water	<ul style="list-style-type: none"> The provision of treated waste water as irrigation water to nearby farm holdings and for recreational purposes is not a feasible option owing to the relatively low yield and current treatment processes at the WWTW.
	Groundwater	<ul style="list-style-type: none"> Nelspoort currently makes use of two existing boreholes and the Municipality is busy to connect a third newly drilled borehole to the existing network. The only NGDB registered boreholes in the vicinity of the town are present within the Teekloof Formation, and it is presumed the town boreholes intersect the same geological unit. There are no predicted future water shortfalls for Nelspoort, with the newly drilled borehole incorporated. The intrusive contact zone between the Teekloof Formation and inclined dolerite sills can also be targeted to the north and north-east of Nelspoort if further water resources are required. Yields are also likely to be in the range of 1-2 l/s, although water quality is likely to be poor due to the mudstone-rich nature of the Teekloof Formation. Desalinisation of the groundwater may therefore be required in some instances to make it potable.
	Surface Water	<ul style="list-style-type: none"> The Sout River runs through Nelspoort and is one of the major water sources for the town. No information is available on whether more water could be abstracted from the river and thus further investigation is required.
	Other Sources	<ul style="list-style-type: none"> Rainwater harvesting is not a suitable option for Nelspoort, considering the low MAP of the area.
	Summary	<p>The current water sources have adequate supply to cater for the medium and longer-term future water requirements. However existing water losses and NRW for the town are extremely high and there should be a major drive to reduce existing losses. The following interventions are recommended for implementation, in order of priority and implementation sequence:</p> <ul style="list-style-type: none"> Full implementation of the newly developed WC/WDM Strategy. Incremental groundwater development. Further abstraction from the Sout River.
Murraysburg	Re-use of water	<ul style="list-style-type: none"> Water re-use is not a feasible augmentation option, since the wastewater treatment process relies on evaporation ponds, where the return to the system is effectively zero.
	Groundwater	<ul style="list-style-type: none"> Murraysburg currently makes use of five boreholes, which are stated to be near the river and most likely target the Quaternary alluvium. The total yield from these five boreholes is given as 1 234 k/d (0.450 million m³/a). The Quaternary alluvium could be targeted again if additional water is needed, provided any future boreholes are situated away from the current boreholes, in order to prevent water-level drawdown interference. The intrusive contact between dolerite dykes/inclined sills and the Teekloof Formation could also yield 1-2 l/s boreholes. This would require geophysical siting however, in order to determine the position of the intrusive contact zone. Water quality may also be poorer in comparison to the alluvial aquifer, due to the mudstone-rich nature of the Teekloof Formation.
	Surface Water	<ul style="list-style-type: none"> The non-perennial Buffels River is located on the outskirts of Murraysburg. Considering that this is a non-perennial river, there may be potential to recharge surrounding boreholes by



Table C.8.4: Potential future water resources for the various towns (DWS's All Towns Reconciliation Strategies)		
Distribution System	Option	Potential
		abstracting seasonal flows from the river into an off-channel storage facility. This option will require further investigation, and be highly dependent on the minimum annual flow that can be assured.
	Other Sources	<ul style="list-style-type: none"> Rainwater harvesting is not a suitable option for Murraysburg as the rainfall is very little.
	Summary	<p>If the implementation of the Water Conservation and Water Demand Management Strategy measures is successful to reduce water consumption by more than 20%, the current yield should be adequate to cater for the future water requirements. The following interventions are recommended for implementation, in order of priority and implementation sequence:</p> <ul style="list-style-type: none"> Implement WC/WDM Strategy measures. Compile a drought plan, monitor abstraction and recharge against preset warning points and manage the borehole abstraction. If and when needed a further borehole can be developed.

C.9. Institutional Arrangement Profile

Beaufort West Municipality is the official WSA for the entire Municipal Management Area and act as the WSP for the area. An approved 2013/2014 WSDP is in place. A comprehensive set of water services by-laws is also in place.

A Service Level Agreement with Water and Wastewater Engineering, converted to NEWATER for the Beaufort West Reclamation Plant, is also in place for the operation of the plant.

At a technical, operations and management level, municipal staff is continuously exposed to training opportunities, skills development and capacity building in an effort to create a more efficient overall service to the users. A Workplace Skills Plan is compiled every year 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 during the last financial year.

Table C.9.1: Training provided during the 2014/2015 financial year (Workplace Skills Plan)			
Course Name	Skills Area	No Trained	NQF Level
Councillor Development Programme	Skills Programme	9	5
New Provincial Requirements	Skills Programme	5	2
Supply Chain Management	Skills Programme	2	4
Local Government Accounting Practices	Short Course – Non-credit	5	3
Service Delivery Practices	Short Course – Non-credit	41	2
Leadership	Skills Programme	12	5
Water Plant Operator	Learnership	10	3
Waste Materials Plant Operator	Learnership	10	2
Building Site Inspector	Learnership	9	3
Website Administrator	Learnership	3	4
Bricklayer	Learnership	24	2
Plumber	Apprenticeship	9	3
Plumbing Inspector	Learnership	8	3
Motor Mechanic	Learnership	11	3
Fitter	Learnership	15	3
Electrician	Apprenticeship	10	3
Artisan Aide	Apprenticeship	135	2
Cable Joiner	Learnership	15	2



It is important for the Municipality to establish a mentoring role for operators ensuring an adequately trained and classified workforce with dedicated training programmes for supervisors and operators. Budgets need to be established to address the shortfall of skilled staff, rethink methods to retain qualified personnel and plan for succession and clear career paths for experienced staff. With such a program a source of specific resources of skilled operators, technicians and managers will be established.

The education of users 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. Beaufort West Municipality provided a large number of new low cost houses over the last number of years.

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 Beaufort West Municipality to compile a Legal Compliance Audit of their WTWs and WWTWs, which will provide the management of Beaufort West Municipality with the necessary information to establish whether the Municipality is in compliance with the legislation or not.

Beaufort West Municipality's Organogram, which include water and sanitation services, is included in Annexure F. Beaufort West Municipality is currently effectively managing its water and sanitation services. Additional capital funding is urgently required to address the bulk infrastructure backlogs (Augmentation of Nelspoort and Beaufort West water sources) and the backlogs with regard to infrastructure rehabilitation and maintenance. All forward planning for water and sanitation infrastructure will be guided by the Water and Sewer Master Plans.

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 the DWS and the sector to provide more effective support.



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

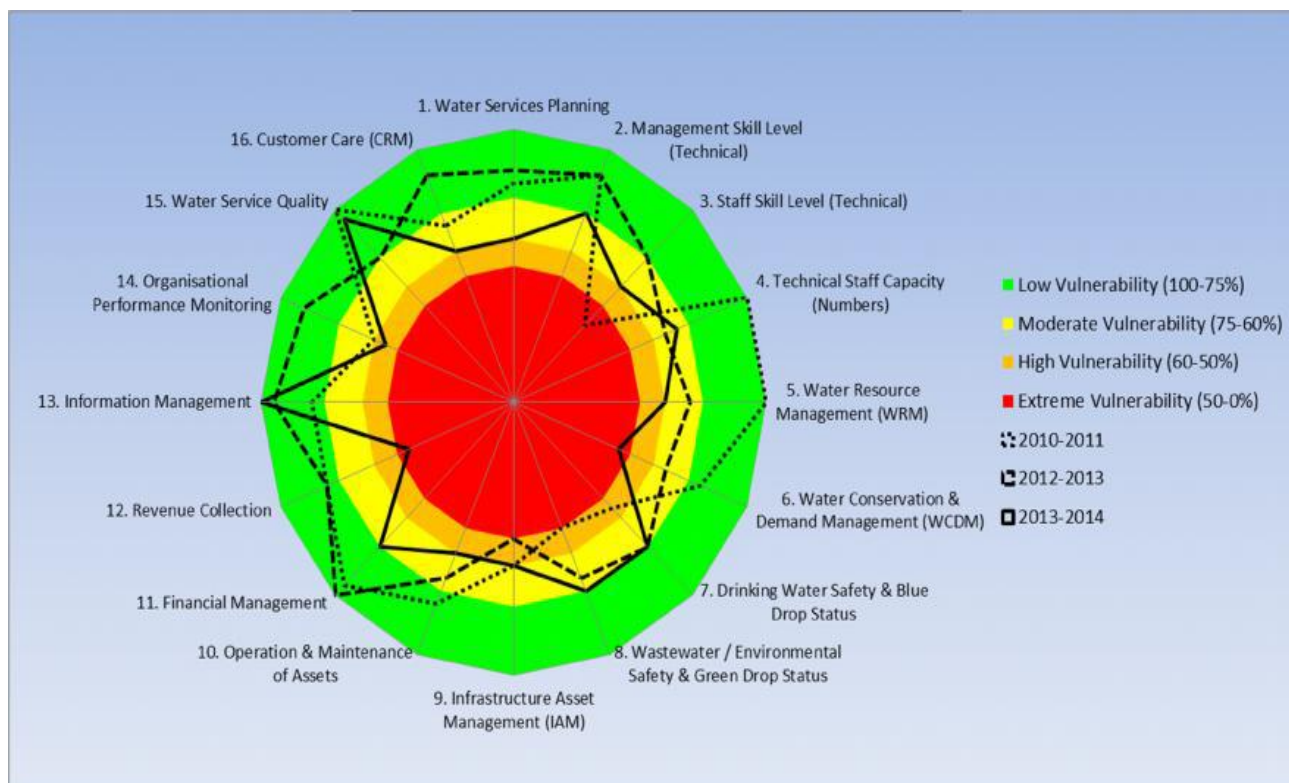


Figure C.9.1: Spider Diagram of the vulnerability levels of Beaufort West Municipality

Table C.9.2: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Beaufort West Municipality	
Section	Vulnerability
Water Services Planning <ul style="list-style-type: none"> Your Water Services Development Plan (WSDP) includes appropriate Water, Sewage and Stormwater Master Plans, a Water Safety Plan and a Wastewater Risk Abatement Plan (W₂RAP). You are implementing an up-to-date, adopted WSDP with the necessary annual reports in your business plan. Please indicate your WSDP Status Quo Knowledge Interpretation Score. Your current project list addresses existing needs/shortcomings identified through the WSDP process. Projects identified through your various planning processes have been implemented in the last 3 years. 	Moderate
Management Skill Level (Technical) <ul style="list-style-type: none"> Key posts within your (council approved) technical management organisational organogram are filled (e.g. Technical Director, Water Services Manager, Superintendent of Water Works). You have sufficient technical management staff (appropriate number of staff - e.g. at least 5 posts per 100,000 persons served). Technical management staff have the correct skills/qualifications and experience (e.g. Pr Eng, Pr Tech, CPM). Managers regularly attend appropriate water services skills development / training. Key technical managers have signed Performance Agreements. 	Low
Staff Skill Levels (Technical)	Moderate



Table C.9.2: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Beaufort West Municipality	
Section	Vulnerability
<ul style="list-style-type: none"> 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, mechanics and electricians have the correct skills/qualifications and experience. Staff regularly attends appropriate water services skills development/training (including safety) (e.g. ESETA courses). 	
Technical Staff Capacity (Numbers) <ul style="list-style-type: none"> The posts within your technical staff organisational organogram are filled. 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 (i.e. you have the appropriate number of staff). An active mentoring/shadowing programme is in place where experienced staff train younger, inexperienced staff. 	Moderate
Water Resource Management (WRM) <ul style="list-style-type: none"> The results from the Reconciliation Strategies (Large Systems/All Towns) have been incorporated into your WSDP. The quantity of water available from the resources is sufficient for your current WSA needs. The quantity of water available from the resources is sufficient for your future WSA needs (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. 	Moderate
WC/WDM <ul style="list-style-type: none"> Your WSA has developed a Water Loss Management Plan which includes a recognized acceptable standard water balance (e.g. IWA). Please indicate your percentage Non-Revenue Water (NRW) by volume. NOTE: Although the limitations of this indicator are known, the indicator still provides valuable insight regarding current status. Bulk water inputs to the WSA are accurately monitored using bulk meters (e.g. check metering). Please indicate what percentage of all connections are metered and billed (residential and non-residential (commercial, industrial, etc.)). Your WSA has implemented appropriate intervention programmes to reduce NRW (e.g. minimisation of night flows through pressure management, removal of unlawful connections, leak detection and repairs). 	Extreme
Drinking Water Safety and Blue Drop <ul style="list-style-type: none"> Please indicate the average Blue Drop score for your WSA. ALL your supply schemes, monitoring programmes, sample points, laboratories and users are registered on the BDS. Council have been made aware of all water safety related issues (including those identified via the Blue Drop Certification programme) and issues have been actioned (where applicable). 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. 	Low
Wastewater / Environmental Safety and Green Drop <ul style="list-style-type: none"> Please indicate the average Green Drop score for your WSA. 	Low



Table C.9.2: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Beaufort West Municipality	
Section	Vulnerability
<ul style="list-style-type: none"> ALL your wastewater works, monitoring programmes, sample points, laboratories and users are registered on the GDS? Council have been made aware of all wastewater and environmental safety related issues (e.g. pollution incidents, Green Drop deficiencies) and 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. 	
Infrastructure Asset Management <ul style="list-style-type: none"> You have an appropriate and up-to-date water services Asset Register (includes asset name, location, condition, useful life, risk analysis, etc.). You have an appropriate Infrastructure Asset Management (IAM) Plan for your WSA (including replacement values). You have implemented an IAM Programme in your WSA (including allocation of appropriate budget and staff). Budget allocated for the IAM Programme is effectively spent. You conduct annual technical assessments of your water and wastewater related systems (including sources, WTWs, WWTWs, pump stations, pipes, valves, etc.) and implement required follow-up actions. 	Moderate
Operation and Maintenance of Assets <ul style="list-style-type: none"> An effective infrastructure operations and maintenance team is available (i.e. sufficient artisans, mechanical, electrical support with correct skills/qualifications and experience). A maintenance facility/workshop that is secure and stocked with critical spare equipment (tools, etc.) is available. Appropriate planned/preventative maintenance is performed at all WTWs and associated reservoirs, pump stations and in distribution network. Appropriate planned/preventative maintenance is performed at all WWTWs and associated collection system, pump stations. Please indicate your infrastructure maintenance costs as a function of total operating costs (%). 	Moderate
Financial Management <ul style="list-style-type: none"> Financial controls - With regard to your last audit report on the financial statements, please state the audit opinion. Cash flow status - Your municipality currently has a positive bank balance (no overdraft) for covering expenditure Financial compliance - Appropriate financial policies and procedures are in place to comply with the Municipal Finance Management Act (MFMA) and Generally Recognized Accounting Practice (GRAP). Financial performance - Please state your mid-term (end December) Capex spend versus allocation (i.e. Service Delivery Budget Implementation Plan (SDBIP) actual costs, and excluding commitments). Liabilities (Creditors) - Money is owed by your municipality to major service providers (e.g. ESKOM, Water Board, largest contractors, etc.) for more than 30 days from receipt of invoice. 	Low
Revenue Collection <ul style="list-style-type: none"> Tariff setting - Current water tariffs are set to be fully cost reflective (and take into account cost of maintenance and renewal of purification plants and water networks, and the cost of new infrastructure). Billing & accounts - Accurate water bills are sent out on time. Revenue collections - Please state the revenue collection rate in respect to water services. Outstanding debtors - Please indicate the trend in the outstanding debtors older than 90 days in respect to water services. Development contributions - With regard to new developments, by-laws in your municipality require developers to adequately contribute towards construction of new bulk infrastructure (i.e. developer's charges). 	Extreme



Table C.9.2: Municipal Strategic Self-Assessment (MuSSA) of Water Services for Beaufort West Municipality	
Section	Vulnerability
Information Management <ul style="list-style-type: none"> Security management & user access control - IT systems policies and procedures are in place and adhered to (e.g. users are registered, access is controlled, IT systems have firewalls, active protection from viruses, etc.). Financial software programs - Appropriate controls for program changes and data centre management exist for financial and billing systems (either "in-house" systems or "external" systems with an appropriate Service Level Agreement). Hardware and IT infrastructure - Adequate computers and networks are available for water and sanitation staff to perform their tasks and record their activities. Communication - E-mail (intranet) and internet functionality is secure, acceptable and accessible by all required personnel (e.g. superintendent and above). ICT service continuity - Adequate back-ups/archiving of operation critical applications, databases, data, etc. is routinely performed in terms of a Disaster Recovery Plan. 	Low
Organisational Performance Monitoring <ul style="list-style-type: none"> Appropriate plans, policies and procedures to address Disaster Management/emergencies and other issues (safety, public participation, communication, etc.) are developed and implemented. An organisational performance management system is developed and implemented (i.e. effectively measure, monitor and track water services performance indicators). Council is stable with functional committees. 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" reports are frequently produced and presented to council for discussion, action and follow-up. 	High
Water Services Quality <ul style="list-style-type: none"> Critical business databases (e.g. personnel details) and documents (e.g. as-built drawings, records, manuals, agreements, billing/revenue collection, etc.) are maintained and stored in secure locations (both paper and electronic). Customers have adequate access to water (at least basic services and no backlogs, sufficient quantity and flow, good quality, minimal interruptions). Customers have adequate access to sanitation (at least basic services and no backlogs, no blockages, minimal impact on environment). 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). 	Low
Customer Care <ul style="list-style-type: none"> A customer services representative and associated complaints register is in place and linked to the Technical Department to investigate and resolve. A functional customer service system is in place to immediately inform customers of service interruption, contamination of water, boil water alert, etc. Please indicate what percentage of the reported water related complaints/callouts are responded to within 24 hours. Please indicate what percentage of the reported wastewater/sanitation related complaints/callouts are responded to within 24 hours. Regular awareness campaigns informing customers of water system O&M activities, water quality, resource protection/pollution, reporting incidents/security concerns, etc. are conducted. 	Moderate
MuSSA Vulnerability Index (2013)	0.58

Beaufort West Municipality's Vulnerability Index for 2013 was indicated as 0.58 "High Vulnerability" in the "2013 Municipal Services Strategic Assessment (MuSSA) for Western Cape Province" Report.



C.10. Social and Customer Services Requirements

A comprehensive Customer Services and Complaints system (IGNITE) is in place at Beaufort West 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.

The table below gives an overview of the water and sanitation areas monitored by Beaufort West Municipality with regard to customer services (queries / complaints).

Table C.10.1: Water and sanitation indicators monitored by Beaufort West Municipality with regard to customer services						
Description	14/15	13/14	12/13	11/12	10/11	09/10
Leaks at households, pipelines and taps	1 366	1 291	1 680	1 996	1 875	2 076
Burst pipes in road reserves	473	349	521	521	608	515
Number of network burst and leaks per 100 km of pipeline	311	230	343	343	400	339

Complaints		14/15	13/14	12/13	11/12
Call out for main sewer	Office hours	564	471	147	48
Call out for sewer connections	Office hours	1 235	1 027	1 153	1 244
Water meters faulty	Repair leak	445	419	582	825
	Test / Replace	225	163	71	83
	Relocate	2	4	0	5
	Prepaid: Repair faulty meter	739	451	1 065	905
	Prepaid: Replace	114	224	11	25
	Prepaid: Replace Box	83	55	19	101
	Prepaid: Tamper Switch	45	55	24	4
	Prepaid: Replace Stop Valve	95	62	40	0
	Prepaid: Sensor Replace	67	26	17	0
	Prepaid: Need to buy water	147	93	65	264
New water connections	Households	4	5	3	0
	Main pipeline	0	0	0	0
	Prepaid meters	74	0	-	-
Leaks at stop valves	Repair	235	244	303	416
	Replace	122	52	45	31
Standpipes	Repair	0	0	0	0
	Replace / new	0	0	0	0
Call out for valves		28	60	30	16
Call out for brown water		0	0	0	0
Call out for water pressure tests		0	0	0	0
Call out for leaks at households, pipelines and taps		1 366	1 291	1 680	1 996
Call out for burst pipes in road reserves		473	349	521	521
Call out for main pipelines		28	30	-	-

Standby – After Hours	14/15		13/14		12/13	
	Beaufort West, Merweville, Nelspoort	Murraysburg	Beaufort West, Merweville, Nelspoort	Murraysburg	Beaufort West, Merweville, Nelspoort	Murraysburg
Call out for main sewer	499	15	389	15	371	13
Call out for sewer connections	429	192	453	226	515	156
Water distribution: Water	612	52	627	45	818	61



Standby – After Hours	14/15		13/14		12/13	
	Beaufort West, Merweville, Nelspoort	Murraysburg	Beaufort West, Merweville, Nelspoort	Murraysburg	Beaufort West, Merweville, Nelspoort	Murraysburg
Meters						
Water distribution: Burst Pipes	251	2	225	3	233	1
Water and Sewer Treatment	69	-	179	-	78	-
Parks	264	-	359	-	238	-
Nelspoort	232	-	200	-	280	-
Merweville	116	-	166	-	209	-
Call outs	-	399	-	647	-	359

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

Beaufort West: Under normal operating condition (i.e. when surface water is available from the Gamka Dam) the water supplied to Beaufort West is a blend of surface and groundwater from various sources. The surface water is from the Gamka Dam and fully treated at the WTW, whereas the groundwater is only chlorinated prior to distribution. A new Wastewater Reclamation Plant was also constructed. The treatment processes consists of the following: Coagulation, Flocculation, Sedimentation and clarification, Filtration, Disinfection, Sludge drying beds and Reactive treatment.

Merweville: No formal WTW exists to treat the water supplied from the boreholes and the water is merely disinfected (gaseous chlorination installation) prior to distribution to end users.

Nelspoort: The water from the Salt River is abstracted at an existing weir and treated at the WTW with the groundwater. The treatment processes consists of the following: Aeration, Filtration and Disinfection

Murraysburg: The water from the boreholes is merely chlorinated (informal manual practise) at the reservoirs prior to distribution to end users.

The quality of potable water (Chemical and Biological) is monitored at the various locations within the distribution systems and tested at an accredited laboratory. The EHPs of the Central Karoo District Municipality also monitors the water quality. Barriers implemented by Beaufort West Municipality against contamination and deteriorating quality include:

- Participate in catchment management and water source protection issues.
- Correct operation and maintenance of the disinfection plants.
- Protection and maintenance of the distribution system. 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.



Four other important barriers against poor quality drinking water that are a prerequisite to those listed above are:

- 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.
- A Service Delivery Agreement with Water and Wastewater Engineering, converted to NEWATER for the operation of the Beaufort West Reclamation Plant.
- 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 2014/2015 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: CB Wright
Title: Technical Services

Date

Signature
Name: JCL Smit
Title: Director Engineering Services

Date

APPROVED:

Signature
Name: J Booysen
Title: Municipal Manager

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 2012 Blue Drop Progress Report.
- DWS's 2013 Green Drop Report.
- DWS's Municipal Water Services Performance Assessment 2012 Report.
- DWS's All Towns Reconciliation Strategy Documents for each of the towns in Beaufort West Municipality's Management Area, 2015.
- 2013/2014 Municipal Services Strategic Assessment (MuSSA) for Western Cape Province, DWS.
- Beaufort West Municipality's Water Services Audit Report for 2013/2014, Final Document, WorleyParsons RSA.
- Beaufort West Municipality's Operational Budgets and Tariffs.
- Asset Register for Water and Sewerage Infrastructure Assets, June 2015.
- SDBIP of Beaufort West Municipality for 2014/2015.



ANNEXURE A

Schematic layouts of the various distribution systems

Water balances for the various distribution systems

Rainfall and WWTW's flows and capacities

WTW's flows and capacities



ANNEXURE B

ILI for the various distribution systems



ANNEXURE C

Water quality compliance sample results
Final effluent compliance sample results



ANNEXURE D

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



ANNEXURE E

Water and Sanitation Operational Budget



ANNEXURE F

Organogram (Water and Wastewater)