



SWARTLAND MUNICIPALITY

WATER CONSERVATION AND DEMAND MANAGEMENT STRATEGY

Working Document

September 2019

Compiled by:

Civil Engineering Directorate

Swartland Municipality

September 2019



SWARTLAND MUNICIPALITY
WATER DEMAND MANAGEMENT STRATEGY
TABLE OF CONTENTS

1. Introductio	2
2. Background to Swartland Municipal Water Supply Systems	2
3. Water Balance	3
4. Situation Assessment	4
5. Demand Management Scorecard	4
6. Water Demand Management Actions	5
7. Key Issues and Challenges	9
8. Targets	10
9. Interventions for 2018/2019	11

ANNEXURE A: IWA STANDARD WATER BALANCE
ANNEXURE B: WDM SCORECARD



1. Introduction

Swartland Municipality is committed to provide water services that comply with service delivery standards and the relevant legislation economically, efficiently and sustainably to customers. Although the Municipality operates a well maintained water distribution system where the input volume is known, leaks are promptly repaired, customers are metered and billed, where there is limited disruption in supply and pressures are within an acceptable range the benefits of Water Conservation and Demand Management (WCDM) and the need to implement WCDM measures are recognised.

WCDM has always been considered an effective way of optimising the capacity and utilisation of existing infrastructure and the Municipality has already made considerable advancements along implementing demand management. Swartland Municipality will continue to implement demand management to that effect and ensure that the WCWDM strategy directs the efforts towards purposeful and sound outcomes.

However, it is recognised that the demand for alternative sources has become immediate and investigation into the different resource options, their feasibility and cost implications are assigned high priority. In the meantime curtailment of consumption and demand, through an appropriate and effective WCWDM strategy, will ensure the optimal use of existing infrastructure and the conservation of water resources.

The aim is have the WCDM strategy and actions complement the broader efforts towards delivering sustainable and efficient water services.

2. Background to the Swartland Municipal Water Supply System

Swartland Municipality is the Water Services Authority (WSA) in its service area and performs the function of a Water Services Provide (WSP) for the distribution and supply of treated water to the end user. A Section 78 investigation was undertaken into the water treatment works and bulk infrastructure and a report on the findings has been made available to the Municipality. The report is currently being studied after which a suitable option and way forward will be considered. Meanwhile the West Coast District Municipality will continue to be responsible for the operations and maintenance of the water treatment works and bulk infrastructure.

Two separate supply systems provide water to the end user. The systems are discussed below:

2.1 Malmesbury system

The Malmesbury system supplies potable water to the towns of Riebeek Kasteel, Riebeek West, Malmesbury, Darling, Yzerfontein, Abbotsdale, Kalbaskraal, Chatsworth and Riverlands.

Water is abstracted from the Voëlvlei dam and treated at the Swartland WTW situated at Sonquasdrift. Bulk distribution networks supply water to various distribution reservoirs situated in the various towns mentioned above. Potable water is distributed through reticulation networks to consumers of the various towns.

In addition Swartland Municipality operates and maintains a bulk supply system from Malmesbury to Abbotsdale, Kalbaskraal, Chatsworth and Riverlands. The supply infrastructure is considered part of the municipality's reticulation network.

2.2 Moorreesburg system

The Moorreesburg system supplies potable water to the towns of Moorreesburg and Koringberg.

Water is abstracted from the Misverstand dam and treated at the Withoogte WTW situated outside Moorreesburg. Bulk distribution networks supply water to distribution reservoirs and reticulation networks in Moorreesburg and Koringberg.

3. Water Balance

A water balance calculation enables the determination of the volume of water being lost by a supply system. The water loss is an indication of the system performance and gives direction for the implementation of saving measures. The International Water Association Standard Water Balance for the Malmesbury and Moorreesburg supply systems is attached as *Annexure A*.

4. Situation Assessment

Swartland Municipality recognizes that uncurtailed water demand is likely to increase more steeply than the normal economic growth rate due to a combination of the following:

- Population growth;
- Redressing backlogs in respect of access to water services;
- Improvement in the standard of living resulting in increase in per capita water consumption;
- Ageing infrastructure.

Water demand must be managed properly as the development of new water sources, the upgrading of treatment plants and the upgrading of bulk distribution infrastructure requires significant capital investment.

It is therefore important to implement WDM measures in order to ensure the sustainability of water supply. Although the availability of water is important it is also recognised that WDM measures will improve the economic efficiency water services.

5. WDM Score Card

The Water Research Commission has developed a Water Conservation and Demand Management Scorecard. The purpose of the scorecard is to ascertain the status quo of existing WDM efforts and to provide an indication of the potential for improvement. Swartland Municipality scores 80 out of a possible 100 indicating that some improvement has been achieved since the implementation of the previous WCDM Strategy. Areas of poor achievement are as follows:

- Community and school awareness and education
- Active leak detection and repairs
- Dedicated personnel for WDM
- Asset management by way of investment in operations and maintenance
- Sectorisation of reticulation networks

The completed scorecard is attached as *Annexure B*.

6. Water Demand Management Actions

6.1 Existing Actions

The following paragraphs discuss the WDM actions. These actions are part of the normal operational and administrative activities of the Municipality on an ongoing basis.

6.1.1 Actions for reducing unaccounted for water and water inefficiencies

- Metering of all water usage – household, standpipes, municipal parks, industrial, commercial and institutional
- Monthly reading and billing of all meters
- Inspection for illegal connections on an ongoing basis;
- Formalising all illegal and/or unmetered connections immediately upon coming to attention
- Metering and billing of temporary consumption, typically by construction companies
- Annual audit of all meters 50mm and larger and replacement of the meters where necessary
- Monthly monitoring of all wet industries and large volume water users for deviations together with appropriate actions in the event of a deviation
- Monthly monitoring and inspection of zero usage consumers
- Repair of burst pipes within 3 hours
- Accurate calculation of water losses and record keeping
- Zone metering
- Day flow metering
- Re-use of treated effluent for the irrigation of sport fields in Moorreesburg, Malmesbury, Darling and Riebeek Kasteel
- Watering of municipal parks during cooler early morning hours
- Re-Use of treated effluent during construction projects instead of potable water, where possible

6.1.2 Actions for Pressure management

- Pressure control at high pressure zones in each of the towns in the Municipal Area.

6.1.3 Actions for leaks and meter repairs

- Leak repairs assistance programme for indigent households
- Meter replacement programme for all connections
- Annual fire hydrant inspection for leaks and functioning
- Retrofitting of municipal buildings with water efficient equipment
- Immediate leak repair in municipal buildings
- Meter audits to determine the accuracy of meter readings

6.1.4 Actions Consumer/End user demand management

- Block tariffs to discourage inefficient and wasteful use of water
- Drought tariffs applicable during times of severe drought
- Central customer care service where leaks are reported by the public
- Incremental levels of stringency for water restrictions, to manage demand during periods of drought and water shortages.
- Notices and communication media on billboards and municipal website raising awareness pertaining water conservation
- Communicating information on municipal bills pertaining water use and target volume savings.

6.1.5 Infrastructure management

- Operations and maintenance schedule
- Regular inspections of water distribution networks, pump stations and reservoirs
- Current Water- and Sewer Masterplan based on current available growth projections

6.1.6 Reduction in Municipal water demand

Municipal parks have been re-landscaped to be less water intensive. Water has been limited to before 8:00 am so as to limit water losses through evaporation.

6.1.7 Alternative resources

The Municipality secured funding for the development of groundwater as an alternative resource. Boreholes have been drilled as an alternative source of water and have yielded reasonable volumes.

6.2 Future Actions

6.2.1 Pressure Management

Although pressure management is already implemented, further savings in non-revenue water may be achieved with new installations and further implementation of active pressure management in both systems.

The savings that can be achieved need to be quantified in order to establish the economic feasibility prior to implementation. The monetary savings in no-revenue water has e to yield a reasonable rate of return on the capital investment. If this is not achieved, the implication on the water tariff must be considered through a cost/benefit analyses. For this purpose a consulting engineer specialising in water demand management has been appointed to investigate and report on the savings that may be achieved with new installations and the introduction of active pressure management.

6.2.2 Leak Repair and Assistance Program

The current Leak Repair and Assistance Program investigates and repairs leaks, only at households registered as indigent households with the municipality in terms of the Indigent Policy. The implementation of the program has to be extended to include all domestic households in low cost housing developments and poor areas, with consumption above 15kl/month. Full implementation of the program has to include the following:

- Visit households on a prioritised basis, highest consumption first
- Educate the customer about the program and water saving measures
- Identify where water is used inefficiently and wastefully and take appropriate action
- Social intervention – awareness campaigns, education, public participation

The savings achieved with this program will not reduce non-revenue water as the water lost through household leaks is already metered and billed. The benefit of the program however is the reduction water demand.

6.2.3 Residential Measures

The use of water efficient fittings should be promoted, either as retrofitting to existing installations or as new installations. The fittings include the following:

- Low flow shower heads;
- Dual flush toilet cisterns;
- Aerated taps;
- Automated irrigation systems.

The use and installation of these fittings should be included as a condition for the approval of building plans as well as provided for in the Water Services Bylaws.

6.2.4 Re-use of treated effluent

Treated effluent is already used for the irrigation of sport fields in Malmesbury, Darling and Moorreesburg. Further opportunities exist in Moorreesburg at the Rosenhof Sport Fields as well as Riebeek Kasteel and Riebeek West. Significant savings in the order of a 110 000 cubic meters per annum can be achieved should these sport fields be irrigated with treated effluent opposed to potable water.

6.2.5 Meter Replacement

It is estimated that there are more than 8 000 meters in operation that are older than 20 years in both the Malmesbury and Moorreesburg supply systems. Water meters are mechanical devices that suffer from wear and tear with age. This leads to metering inaccuracies and adds to non-revenue water. Meters should therefore be replaced through a targeted approach. In order to achieve this, a meter management and replacement programme should be developed and implemented.

6.2.6 Night Flow Analyses

Ongoing night flow analyses should be implemented as part of the normal operational activities of the Municipality. This will provide information on system performance and give direction for interventions.

6.2.7 Leakage Detection

Leak detection should be conducted by means of a specialised leak detection service provider in areas with high minimum night flows.

6.2.8 Zone Metering

District zones metering enable the identification of poor performing and leaking distribution infrastructure. At present each town in the Malmesbury and Moorreesburg supply systems comprises a district zone. This is not considered to be sufficient for Malmesbury, Moorreesburg and Darling. A further break down into smaller district zones should be implanted. The district zones should also be provided with equipment that enables remote flow and pressure logging via the scada system.

6.2.9 Alternative water resources

Boreholes will have to be further developed and equipped with the necessary mechanical and electrical equipment. Infrastructure such as reticulation networks will have to be upgraded and expanded to receive water from the new resource.

Further studies into the feasibility of desalination will have to be conducted.

Further studies in the reclamation of treated effluent to potable water will have to be conducted.

7. Key Issues and Challenges

The most significant challenge is to secure sufficient resources for the further implementation of WDM actions. Certain actions can be introduced as part of the existing operational activities of the municipality but others would require additional capital and/or operational resources. The Municipality is increasingly financially strained due to escalating operational costs, costs associated with legal compliance and reporting matters, non-payment and limitations on the annual increasing of tariffs. The Municipality is not in a position at present to implement measures that would require additional capital or operational resources. Only

actions that can be accommodated as part of the existing operational activities can be considered.

8. Targets

8.1 Annual Water Demand

In the past the annual water demand has kept at an average of 1.65% which was acceptable. With the drought the province has experienced since 2016, extreme water restrictions were implemented which distorts the current annual water demand trends.

The water restrictions have brought on a low level water demand which is not realistic or sustainable in the long run. Once the restrictions are relaxed or entirely lifted, and normalisation of demand is expected. We anticipate that the normalised demand will be lower than the pre-drought demand, but further investigations will give a more accurate indication of exactly what a realistic demand projection is.

The Municipality is currently undertaking a comprehensive study in which the exact impact of the restrictions will be determined and analysed as well as the determination of a reviewed annual water demand projections.

In lieu of For the interim a continued projected increase of 1.65% increase from the 2014-2015 consumption is considered as acceptable, until such time as available data has been properly analysed.

The tables below indicates the actual demand in each system and the decrease in demand from the previous year

TABLE 1: MOORREESBURG SUPPLY SYSTEM CONSUMPTION

Year	Consumption kilolitre	Decrease in Consumption	
		kilolitre	%
2014/2015	927 500		
2015/2016	843 585	-83 915	-9.05
2016/2017	620 814	-222 771	-26.41
2017/2018	399 823	220 991	-31.40
2018/2019	454 208	54 385	13.6

TABLE 2: MALMESBURY SUPPLY SYSTEM CONSUMPTION

Year	Consumption kilolitre	Decrease in Consumption	
		kilolitre	%
2014/2015	4 871 638		
2015/2016	4 634 858	-236 780	-4.86
2016/2017	3 985 244	-649 614	-14.02
2017/2018	2 387 076	- 1 074 435	-31.40
2018/2019	2 689 556	302 480	12.67

8.2 Non Revenue Water

The table below indicates the NRW for each of the Malmesbury and Moorreesburg supply systems since 2014/2015

Non-Revenue Water		
Year	Malmesbury System	Moorreesburg System
2014-2015	15.18	13.98
2015-2016	18.33	14.82
2016-2017	13.81	13.69
2017-2018	18.17	23.84
2018-2019	15.84	21.54

At present the recently implemented WDM actions such as the pipe replacement programme and the meter replacement programme together with other actions listed in paragraph 5 above will improve the NRW. The target for NRW is to keep it below 16% for the Malmesbury System and below 15% for the Moorreesburg system.

9. Interventions

As mentioned in paragraph 5 above only interventions that would not require any additional operational resources or capital resources can be considered. The following interventions are proposed:

9.1 Minimum Night Flow Analyses

Magnetic flow meters were installed at the outlets of all distribution reservoirs in both the Malmesbury Supply System and the Moorreesburg Supply System and commissioned in the 2013/2014 financial year. The project was enabled through an ACIP grant allocation by the Department of Water Affairs.

However proper data collection of night flows has been hampered by continuous vandalism to mechanical and electrical equipment. An assessment and review of the current security measures should be undertaken and new security measures implemented in order to safeguard monitoring equipment. .

9.2 Pipe Replacement Program

Swartland Municipality has been able to continuously secure funding for implementation of the pipe replacement program. The initial program has largely been implemented and is currently under review. The reviewed program will identify and prioritise new upgrades which will enable the Municipality to continue utilising available funds in a meaningful way. This project will be implemented under the supervision of the Director: Civil Engineering.

9.3 District Zones

Investigation should be undertaken to introduce smaller district zones in Malmesbury. This will enable future analyses of the distribution to evaluate the need for leak detection and repair.

9.4 Alternative water resources

There has been made budgetary provisions in the 2017/2018, 2018/2019 and 2019/2020 financial years to investigate and determine the feasibility of developing groundwater as an alternative resource.

ooOOoo

ANNEXURE A

IWA STANDARD WATER BALANCE

STANDARD IWA WATER BALANCE				2018/2019
Malmesbury System				
SYSTEMS INPUT VOLUME 3195792,000	AUTHORISED CONSUMPTION 2 695 947,584	BILLED AUTHERISED 2 689 556,000	BILLED METERED 2 689 556,000	REVENUE WATER 2 689 556,000
			BILLED UN-METERED 0,000	
		UNBILLED AUTHERISED 6 391,584	UNBILLED METERED 0,000	NON REVENUE WATER 506 236,000 15,84%
			UNBILLED UN-METERED 6 391,584	
	TOTAL LOSSES 499 844,416 15,64%	APPARENT LOSSES 84 973,551	UNAUTHERISED CONSUMPTION (ILLEGAL CONNECTIONS) 9 996,888	
			METER INACCURACIES 49 984,442	
			DATA TRANSFER ERRORS 24 992,221	
		REAL LOSSES 41 4870,865	LEAKAGE ON TRANSMISSION SYSTEM 340 194,110	
			LEAKAGE AND OVERFLOW OF RESERVIOIRS 49 784,504	
			LEAKAGE ON SERVICE CONNECTIONS 24892,252	



STANDARD IWA WATER BALANCE				
Moorreesburg System				2018/2019
SYSTEMS INPUT VOLUME 579 115,000	AUTHORISED CONSUMPTION 455 366,230	BILLED AUTHERISED 454 208,000	BILLED METERED 454 208,000	REVENUE WATER 454 208,000
			BILLED UN-METERED 0,000	
		UNBILLED AUTHERISED 1 158,230	UNBILLED METERED 0,000	NON REVENUE WATER 124 907,000 21,57%
			UNBILLED UN-METERED 1 158,230	
	APPARENT LOSSES 21 037,291	UNAUTHERISED CONSUMPTION (ILLEGAL CONNECTIONS) 2 474,975		
		METER INACCURACIES 12 374,877		
		DATA TRANSFER ERRORS 6 187,439		
	TOTAL LOSSES 123 748,770 21,37%	REAL LOSSES 102711,479	LEAKAGE ON TRANSMISSION SYSTEM 84 223,413	
			LEAKAGE AND OVERFLOW OF RESERVIORS 12 325,377	
			LEAKAGE ON SERVICE CONNECTIONS 6162,689	



ANNEXURE B

WDM SCORECARD

