



## **WATER AND SANITATION DEPARTMENT**

### **ANNEXURE F:**

# **WATER CONSERVATION AND DEMAND MANAGEMENT MEASURES**

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### NOMENCLATURE

CoE	City of Ekurhuleni
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
IWA	International Water Association
KPI	Key Performance Indicator
MNF	Minimum Night Flow
NRW	Non Revenue Water
RDP	Reconstruction and development programme
SANS	South African National Standards
UFW	Unaccounted for Water
WCWDM	Water Conservation and Water Demand Management
WSA	Water Services Authority
WTW	Water Treatment Works
WUL	Water Use Licence

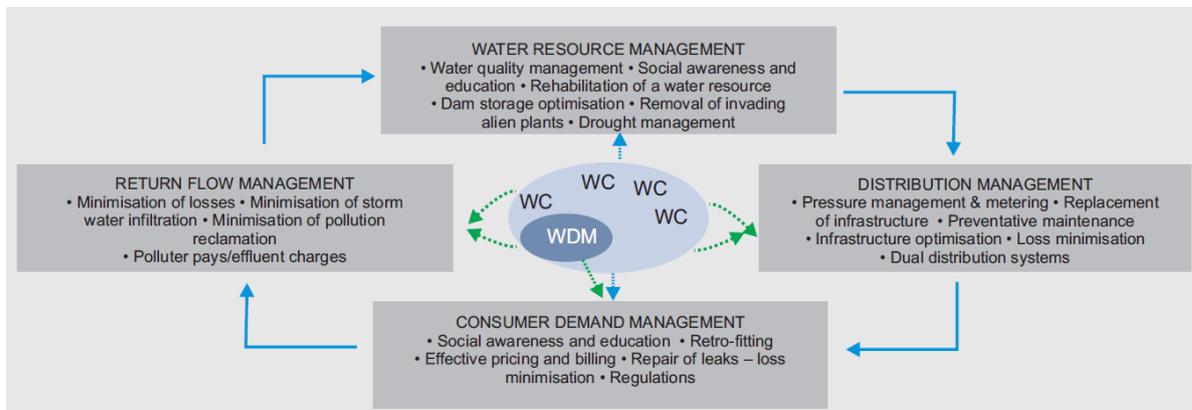
# 1. WATER CONSERVATION AND DEMAND MANAGEMENT MEASURES

## 1.1. General

The National Water Act, 1998 (Act No. 36 of 1998) requires the development of a water management strategy to facilitate proper management of a Water Services Authority's (WSA) water resources.

For CoE to implement a successful water demand management strategy and business plan requires a clear understanding of the status quo of the water supply and distribution systems in terms of their available water resources, water losses, non-revenue water, efficiencies and to determine realistic targets to align available water supply to the required demand for financial sustainability.

Consultants developing a water conservation and water demand management (WCWDM) strategy for the CoE jurisdiction shall compile such a strategy in accordance with International Best Practice guidelines. The typical elements of a WCWDM strategy is illustrated in **Figure 1**.



**Figure 1: Elements of WCWDM (DWA National Water Resource Strategy)**

This section should be read in conjunction with the following documents and guidelines:

- Guideline for the Development of a Water Conservation and Water Demand Management Strategy (DWS, 2018).
- The development of a municipal water conservation and demand management strategy and business plan as required by the Water Services Act, South Africa (Water SA Vol. 39 No 3 WISA 2012 Special Edition 2013). Available on website <http://www.wrc.org.za>.
- Blue Drop and No Drop Handbook (DWA, 2014). Available on website <http://www.DWA.gov.za>.
- Water Demand Management Cookbook (UN-Habitat/ Rand Water/ WRP). Available from Rand Water.

This Section will provide the consultant with the basic requirements for implementing water loss interventions (refer to the Blue Drop and No Drop Handbook).

## 1.2. Community awareness and education

This will be the most important water loss intervention and linked to the efficacy of the technical interventions. The community should be engaged to ensure they understand the reasons for the intervention before the implementation of the technical interventions discussed in **Section 2** to **Section 11** below.

### **1.3. Understanding the water supply and distribution System**

It is important to understand how the water supply system is operated and how it is broken up into supply and distribution zones. This can be done by obtaining as-built information from the CoE's Water and Sanitation Department.

The consultant shall determine the water consumption status quo for the area under consideration before implementing any water loss interventions. This will typically involve the compilation of a water resources balance diagram and an International Water Association (IWA) water balance diagram to identify all water consumers within the CoE as a basis to start investigating water loss interventions.

### **1.4. Leak location and repair**

The CoE will repair all visible and reported leaks on their water supply and distribution system up to the point of the municipal connection i.e. water meter installation. This will be done through the CoE water and sanitation maintenance team.

### **1.5. Pressure management**

It has been shown in some instances that leakages is directly related to pressure, the higher the pressure the larger the leaks. Therefore, pressure management can be considered as one of the most cost effective methods to reduce water losses. Pressure management can be implemented on the municipal supply side through sophisticated hydraulic and/or electronic pressure control systems or on the consumer side through fixed outlet pressure control installations.

### **1.6. Sectorising**

The CoE like most Metropolitan Municipalities have very large water supply and distribution systems, which can result in some difficulty to identify the root cause of water losses on the municipal supply system. By sectorising the large supply areas into more manageable sized areas will assist the CoE to identify problem areas faster through a process of step testing.

In the event that pressure management is found to be less effective than planned, the process of sectorising the CoE's supply and distribution areas should be investigated. The consultant shall investigate and propose how large supply and distribution areas can be sectorised efficiently with the least inconvenience to its consumers in the event of supply interruptions.

### **1.7. Logging and analysis of minimum night flows**

Once the most effective sectorising solution is implemented, the flows and pressures within each sector can be monitored to identify problem areas. This will be done through the installation of loggers to automatically transmit pressure and flow in real time. This will provide the CoE and consultant with the required information to investigate the cause of the problem in each sector.

### **1.8. Bulk management meters**

Bulk management meters are installed with the sectorising process to assist the CoE in effective operation and maintenance of their water supply system. These flow meters are to be installed on the bulk supply feed to each sector.

Accurate measurement is the minimum requirement for any water supply system and assist with determination of minimum night flow (MNF) into an area.

Bulk water meters shall be installed according to the following order of priority:

1. Measurement of bulk sources i.e. at outlets of WTW, springs and total supply of boreholes followed by individual borehole meters.
2. Measurement of supply into various supply zones.
3. Measurement of flow in distribution/transmission pipelines.
4. Measurement of supply into district metered areas

### 1.9. Bulk consumer meters

These flow meters are to be installed at large industrial consumers whom require reliable supply as well as schools, shopping centres etc. regarded as high consumers of water.

### 1.10. Domestic metering and billing

In South Africa, most low-income areas have a lack of domestic flow meters resulting in households not being billed for their water consumption. For the CoE to be sustainable it is necessary to meter and bill all consumers. All new domestic flow meters shall be smart meters to eliminate the need for manual flow readings and reduce billing inaccuracies. Should metering of each low-income consumer not be possible it should be considered to charge these consumers a flat rate based on typical water consumption figures, and measure standpipe consumption for RDP housing.

### 1.11. Baseline establishment

All the above water loss interventions will allow a baseline water consumption to be established against which savings would be measured.

### 1.12. WCWDM Master Plan or WCWDM Strategy

If a WCWDM Master Plan has been developed, and approved by the CoE, the consultant's strategy needs to be aligned with that of the WCWDM Master Plan. Where no such strategy has been developed, the consultants need to develop a strategy in terms of best practise guidelines, that best responds to the shortcomings identified in the IWA water balance (against the No Drop Key performance areas), will bring about the highest volumetric gain and or return on investment for the CoE. Clear NRW targets and KPI's as well as the associated budgetary requirements need to be defined and agreed with the CoE, in order to measure, monitor and achieve the strategic goals.

### 1.13. Available WCWDM measures

The available international WCWDM measures illustrated in **Table 1** shall only serve as a guideline for selecting appropriate method of water loss interventions.

**Table 1:** Available International Water Conservation and Demand Management Measures

WCWDM Measures	Basic Guidelines	Intermediate Guidelines	Advanced Guidelines
Universal metering <sup>3</sup>	<ul style="list-style-type: none"> <li>• Source water metering</li> <li>• Service connection metering and reading</li> <li>• Meter public use water</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed interval meter reading</li> <li>• Meter-accuracy analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Test, calibrate, repair and Replace meters</li> </ul>
Water accounting and loss control <sup>1</sup>	<ul style="list-style-type: none"> <li>• Account for water</li> <li>• Repair known leaks</li> </ul>	<ul style="list-style-type: none"> <li>• Analyse UFW</li> <li>• Water system audit</li> </ul>	<ul style="list-style-type: none"> <li>• Loss prevention program</li> </ul>

WCWDM Measures	Basic Guidelines	Intermediate Guidelines	Advanced Guidelines
		<ul style="list-style-type: none"> <li>Leak detection and repair Strategy</li> <li>Automated sensors/telemetry</li> </ul>	
Costing and pricing <sup>3</sup>	<ul style="list-style-type: none"> <li>Cost-of-service accounting</li> <li>User charges</li> <li>Metered rates</li> </ul>	<ul style="list-style-type: none"> <li>Cost analysis</li> <li>Non promotional rates</li> </ul>	<ul style="list-style-type: none"> <li>Advanced pricing methods</li> </ul>
Information and Education <sup>3</sup>	<ul style="list-style-type: none"> <li>Understandable water bill</li> <li>Information available</li> </ul>	<ul style="list-style-type: none"> <li>Informative water bill</li> <li>Water bill inserts</li> <li>School program</li> <li>Public education program</li> </ul>	<ul style="list-style-type: none"> <li>Workshops</li> <li>Advisory committee</li> </ul>
Water-use audits <sup>3</sup>		<ul style="list-style-type: none"> <li>Audits of large-volume users</li> <li>Large landscape audits</li> </ul>	<ul style="list-style-type: none"> <li>Selective end use audits</li> </ul>
Retrofits <sup>1</sup>		<ul style="list-style-type: none"> <li>Retrofit kits</li> </ul>	<ul style="list-style-type: none"> <li>Distribution of retrofit kits</li> <li>Targeted programs</li> </ul>
Pressure Management <sup>1</sup>		<ul style="list-style-type: none"> <li>System wide pressure management</li> </ul>	<ul style="list-style-type: none"> <li>Selective use of pressure reducing valves</li> </ul>
Landscape efficiency <sup>2</sup>		<ul style="list-style-type: none"> <li>Promotion of landscape efficiency</li> <li>Selective irrigation metering</li> </ul>	<ul style="list-style-type: none"> <li>Landscape planning and renovation</li> <li>Irrigation management</li> </ul>
Replacements and promotions <sup>3</sup>			<ul style="list-style-type: none"> <li>Rebates and incentives [Non-residential]</li> <li>Rebates and incentives [residential]</li> <li>Promotion of new technologies</li> </ul>
Reuse and recycling <sup>1</sup>			<ul style="list-style-type: none"> <li>Large industrial applications</li> <li>Large volume irrigation Applications</li> <li>Selective residential applications</li> </ul>
Water-use regulation <sup>3</sup>			<ul style="list-style-type: none"> <li>Water-use standards and Regulations</li> </ul>
Integrated resource management <sup>3</sup>			<ul style="list-style-type: none"> <li>Requirements for new development</li> <li>Supply-side technologies</li> <li>Demand-side technologies</li> </ul>

<sup>1</sup> Minimise AADD

<sup>2</sup> Minimise Maximum peak or day demand

<sup>3</sup> Both