

Municipal **WDM** Balanced Scorecard Model

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Municipal WDM Balanced Scorecard Model

Developed through

SOUTH AFRICAN WATER RESEARCH COMMISSION

by

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WRP (Pty) Ltd.

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IMPORTANT

PREFACE

This document incorporates the user guide to the South African WDM Balanced Scorecard Model which has been developed through the Water Research Commission (WRC) in association with WRP Pty Ltd.

The Municipal Balanced Scorecard model represents one of several models that have been developed through the WRC in order to assist water suppliers to manage and reduce their levels of unaccounted-for water. The models are supplied free-of-charge through the WRC for use within South Africa and further details can be obtained from the WRC web site on <http://www.wrc.org.za>.

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TECHNICAL SUPPORT

The WRC does not provide technical support on the MUNICIPAL WDM BALANCED SCORECARD MODEL and any questions or problems associated with the program can be directed to the model developers at ronniem@wrp.co.za or wrp@wrp.co.za.

Executive Summary

Before any WDM intervention is implemented, it is normal practice to undertake an investigation of the area in question in order to assess the key problems and to propose a strategy to address the critical issues. The resulting WDM strategy usually includes recommendations of a range of interventions designed to address the main problems in order to reduce losses and/or the consumptive use.

Balanced Scorecards have been used for many years to assess and monitor complex situations which involve a wide range of functions, many of which cannot be assessed or quantified in a normal manner. It is ideally suited to multi-disciplinary activities such as the operation and management of a water utility for example. In such an organisation there may be various technical issues that must be assessed and monitored as well as different human resources and financial activities, etc., all of which are important in their own right but cannot be compared or measured directly with each other. It is therefore difficult to evaluate and measure the overall performance of the utility without resorting to some form of Balanced Scorecard approach.

In 2002 a highly simplified version of the Balanced Scorecard methodology was adopted in South Africa to evaluate the many aspects of a WDM strategy for a large water supplier. The Balanced Scorecard was ideally suited to the evaluation and monitoring of the WDM activities which included items such as education and awareness, leak location, water auditing, etc. The methodology was quickly modified into a simple spreadsheet comprising 25 key issues each of which carried different weightings in accordance with their perceived importance. The approach was found to be very useful and was subsequently modified and customised to evaluate the WDM situation in several hundred municipalities throughout South Africa as well as in several other countries around the world. It was found to be very helpful in developing a quick and pragmatic WDM strategy for a water supply authority and the respective clients using this approach also found the process extremely helpful since they were involved directly with the evaluation and scoring of each item.

The methodology is far from complicated and is very simple and straightforward to use. It is extremely flexible and can be modified to suit a specific application or client or even be colour coded if this is considered easier to understand. Many variations of the methodology have already been applied and the items included in the scorecard can be reduced or increased where appropriate. From the analysis of more than 300 municipalities it has been found that between 20 and 40 items is generally more than sufficient to capture the key elements needed by a specific water supplier to develop a practical WDM strategy. When more items are included, it tends to become a more academic exercise with the subsequent risk of losing focus on the key problem issues to be addressed.

Acknowledgements

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1. INTRODUCTION

One of the first steps in addressing water losses from a water reticulation system involves undertaking a basic assessment of the system in question in order to gain a thorough understanding of the key problem issues facing the water supplier. Only after assessing a system and identifying the problems, can a meaningful WDM strategy be developed. Such an assessment can take a variety of forms and can involve not only a site visit to the supply area but detailed site investigations including flow and pressure loggings. The scope of any initial investigations usually depends on the size of the specific water supply system being investigated as well as the budget available to undertake the assessment. A preliminary water balance based on the standard IWA methodology (WRC, 2002) is always one of the key issues to be addressed and will generally be required before any new WDM interventions are considered or implemented.

Many municipalities and water service providers are in a state of confusion when it comes to assessing their water losses and trying to identify what they should be doing to tackle such losses. Even developing a basic water balance is beyond many water suppliers, some of whom have no management meters in place and therefore have little understanding of how much water is being supplied or sold. Developing a reliable water balance in such cases is often the first main hurdle to be overcome before a meaningful WDM strategy can be proposed.

Awareness of water losses has taken on a new urgency over the past decade in many parts of the world where water scarcity has become a critical issue. During this time, many new tools and techniques have been developed to assist the water suppliers with their efforts in curbing water losses and improving water use efficiency. The WDM interventions available to water suppliers cover both technical and social issues and in most cases a combination of both is required. Experience has shown that even the most appropriate technical intervention is likely to fail if the community it serves has not been involved with its inception. Any successful and sustainable WDM intervention should therefore be based on sound technical interventions supported by comprehensive social and educational programmes. A comprehensive WDM Strategy will likewise involve a wide range of technical interventions supported by numerous social and awareness interventions.

In order to assist water suppliers to develop a basic and pragmatic WDM strategy a simple and effective approach was developed based on the Balanced Scorecard methodology. The balanced scorecard methodology has been in the public domain for many years and is fully described by Norton & Kaplan (1992 & 1996) who are widely credited with being the originators of the methodology. In South Africa the Balanced Scorecard approach had been in use for many years and was being used in the late 1990s and early 2000s by the largest water utility in the country, Rand Water under the guidance and support of Mr Les Shone (personal communication). The system developed by Mr Shone for the water utility was a very sophisticated and comprehensive management system used to monitor and report on virtually all aspects of the bulk water supply business. The system was used to assess performance across a wide range of activities covering both technical performance and human resources within the water utility. From discussions with Mr Shone, it was clear that the same methodology, albeit a

highly condensed version, could be used to create a basic WDM strategy for a normal sized water utility quickly and effectively. The methodology is extremely flexible and powerful, allowing users to customise the approach in many ways to provide either a simple and very quick assessment, or to create a more complicated and thorough assessment.

2. CONCEPTS OF A BALANCED SCORECARD

Most large and well-managed international organisations use performance indicators to assess and continually monitor their internal performance in regard to quality, quantity, cost and reliability of products and services delivered. These companies have clearly defined business objectives and action plans to measure their progress and successes. The most current and appropriate performance management tool to achieve this is the Balanced Scorecard.

The Balanced Scorecard as it was originally designed, is simply a framework that expresses various key elements of a business in a series of performance indicators which can be monitored and/or measured continually in order to assess overall performance. In a typical business entity the following core issues are usually considered namely:

- vision,
- mission,
- strategic intent,
- legislation,
- external impacts
- long-term business direction.

Each of these issues can be split into a number of sub-sections, which can be evaluated and rated on a regular basis. By setting up a comprehensive system based on the Balanced Scorecard methodology, the overall performance of the business can be monitored and measured. This performance measurement and management process incorporates both financial and operational concerns and is based on various performance drivers that are continuously tracked over time to determine trends, best/worst practices, areas for decision making, increase efficiency, enhance service delivery and improve productivity.

The Balanced Scorecard is effectively a framework that translates the various key issues of a business into performance drivers. These performance drivers provide an early warning system for management by measuring progress against the prioritised performance goals, short-term operational goals and strategic initiatives of the organisation to meet future management opportunities and challenges.

The Balanced Scorecard system was originally developed specifically to assist with the overall performance management and evaluation of a complex business unit. It can, however, be used at a much simpler level to support the management and monitoring of many other problems, such as the implementation of a WDM strategy for a water supplier. In this instance, many of the more sophisticated components and concepts described by Norton & Kaplan (1996) can be excluded. This was the approach used to create a simple yet effective tool to assist water suppliers in creating a basic WDM strategy. It has been used with great success throughout South Africa as well as in many other parts of the world. Although the methodology is very simple and straightforward, it is sufficiently flexible to enable water suppliers or WDM specialists to tailor the approach to suit specific requirements and at the desired level of detail.

3. THE SCORECARD

A basic scorecard as shown in **Figure 1** was initially created in 2002 for one specific water supplier serving approximately 1 million residents. As can be seen in **Figure 1**, there are 20 questions each of which carries a maximum of 20 or 10 points depending upon the importance of the issue being considered. If the Municipality has the specific item completely under control, it receives the maximum points and if it is neglecting the item completely it receives no points. There are various levels between the maximum and minimum number of points assigned to the Municipality for each item depending on the level of completeness or lack thereof. The questions and scoring system were discussed by the project team and personnel from the water supplier in order to produce a document that could be used and updated regularly to highlight any progress or update the WDM strategy where necessary.. It should be noted that the level of detail included in this strategy is relatively low and the main purpose of the exercise was to identify areas where effort can be placed in order to improve the efficiency of water supply in the area of supply. A more comprehensive strategy can easily be developed by increasing the number of issues to be addressed and some subsequent assessments have included up to 100 such issues. For most purposes, 20 to 40 key issues are considered sufficient to develop a practical and meaningful WDM strategy.

Name of Municipality / Water Service Provider:		Nelson Mandela Metropolitan Municipality		
Assessment Date:		August 2007 to November 2008		
Item No.	Description	Max Points	Score	Comments
1	Development of a standard water balance	20	10	
2	Pressurised water supply to all customers 100% of the time	20	20	
3	Proper billing system in place	20	15	
4	Commercial and Industrial Meter Reading	20	10	
5	Efficient Leakage Reporting System	20	10	
6	Planned Maintenance of all infrastructure - based on % of network value per annum	20	10	
7	Effective WC/WDM Section in Place	20	5	
8	Sectorisation of reticulation system in place	20	10	
9	Control and Boundary Valve Maintenance Programme	10	5	
10	Efficient bulk management metering system in place	10	7.5	
11	Efficient Zone management metering system in place	10	7.5	
12	As built drawings of all bulk and reticulation infrastructure	10	7.5	
13	Pressure management	10	2.5	
14	Asset Register	10	7.5	
15	Active Leakage Control	10	5	
16	Community Awareness and Education Programmes related to Water Conservation	10	2.5	
17	School Awareness and Education Programmes related to Water Conservation	10	2.5	
18	Informative Billing / Itemised Billing	10	7.5	
19	Newspaper / Radio WDM Education in Place	10	5	
20	WDM Posters and leaflets for distribution in various languages	10	2.5	
		Total	280	152.5

Figure 1: Summary of WC/WDM Scorecard

From the example shown in **Figure 1**, it can be seen that the scorecard suggests a total score of 152 out of a possible 280 which clearly indicates that many items can be improved. This in itself is very helpful as it can be used to highlight the key areas of deficiency and what measures are required to address them.

Following the initial assessment undertaken in 2002, a more detailed Scorecard (shown in **Figure 2**) was developed for the City of Tshwane in South Africa, a metropolitan area

supporting over 3 million residents including the Capital City of Pretoria. The Scorecard methodology was modified at the request of the Water Supplier to include 25 issues each of which was given an equal weighting with a total possible score of 100. The assessment which ultimately led to the development of a detailed WDM Strategy was undertaken through a series of meetings with various technical and non-technical representatives from the Municipality. The aim of the scorecard was to establish key issues where the City of Tshwane felt that improvements in the manner in which the water supply system is managed could be implemented in order to reduce wastage and increase income. A summary of the key issues included in the final scorecard developed by the authors in association with the technical personnel from the City of Tshwane is provided in **Figure 2**.

Item No	Description
1	Development of Standard Water Balance
2	Pressurised Supply to all consumers 100% of time
3	Residential Metering System
4	Non Residential Meters (Commercial, Industrial and Institutional)
5	Effective Billing System including Informative Billing
6	Network (Leakage) Complaints System
7	Billing and Metering Complaints System
8	Asset Register for Water Reticulation System
9	Asset Management - Capital Works
10	Asset Management - Operations and Maintenance
11	Dedicated WDM support
12	Active Leakage Control
13	Effective Sectorisation
14	Effective Bulk Meter Management
15	Effective Zone Meter Management and Assessment of Minimum Night Flows
16	Pressure Management and Maintenance of Pressure Reducing Valves
17	As-Built Drawings of Bulk and Reticulation Infrastructure
18	Schematic Layout of Water Infrastructure
19	Regulations and Bylaws
20	Tariffs
21	Technical Support to Customers
22	Removal of Unlawful Connections
23	Community Awareness and Education Programmes
24	Schools Awareness and Education Programmes
25	Newspaper & radio articles plus posters and leaflets for distribution

Figure 2: Summary of key issues included in scorecard

The assessment process used to rate the various issues and give each issue a score from 0 to 4 involved workshop type meetings attended by representatives from the water supplier and facilitated by members of the project team. At these meetings, each issue was discussed at length and any progress or shortcomings were identified. Based on the discussions, a score was assigned to the issue and finally the assessment was completed as shown in the example presented in **Figure 3**. In the example provided, it can be seen that the water supplier achieved a score of 63 out of a possible 100. The results in this case have been colour-coded to highlight the key problem areas which are shown in red.

Once again it should be noted that the system used can easily be customised to the user's requirements and different scoring systems, with variable weightings with or without colour coding are options that can be used.

Item No	Description	Max Points	Points	Comments
1	Development of Standard Water Balance	4	2	
2	Pressurised Supply to all consumers 100% of time	4	3	
3	Residential Metering System	4	3	
4	Non Residential Meters (Commercial, Industrial and Institutional)	4	3	
5	Effective Billing System including Informative Billing	4	3	
6	Network (Leakage) Complaints System	4	1	
7	Billing and Metering Complaints System	4	2	
8	Asset Register for Water Reticulation System	4	1	
9	Asset Management - Capital Works	4	1	
10	Asset Management - Operations and Maintenance	4	1	
11	Dedicated WDM support	4	0	
12	Active Leakage Control	4	2	
13	Effective Sectorisation	4	1	
14	Effective Bulk Meter Management	4	3	
15	Effective Zone Meter Management and Assessment of Minimum Night Flows	4	2	
16	Pressure Management and Maintenance of Pressure Reducing Valves	4	2	
17	As-Built Drawings of Bulk and Reticulation Infrastructure	4	3	
18	Schematic Layout of Water Infrastructure	4	3	
19	Regulations and Bylaws	4	1	
20	Tariffs	4	3	
21	Technical Support to Customers	4	2	
22	Removal of Unlawful Connections	4	1	
23	Community Awareness and Education Programmes	4	0	
24	Schools Awareness and Education Programmes	4	0	
25	Newspaper _radio articles plus posters and leaflets for distribution	4	0	
Total		100	43	

Figure 3: Example of a completed WDM Scorecard

From **Figure 3** it can be seen that the scorecard suggests a total score of 63 out of a possible 100 suggesting that the water supplier used in the example is addressing water conservation and water management actively but that there is still significant room for improvement.

Each of the 25 issues considered in the scorecard is accompanied by a separate table in which details of the assessment and how it should be scored are provided. By assessing and scoring each item it is usually possible to quickly identify the key areas of deficiency with regard to WDM in a water supply system. This assessment approach has been highly successful throughout South Africa and has been used successfully for both large and small municipalities. Details of each item used in the scorecard are provided in the remainder of this section.

3.1. STANDARD WATER BALANCE

1. Development of Standard Water Balance	Score
WSA has developed reliable water balance and results indicate UAW/NRW at less than 20%	4
WSA has developed reliable water balance and results indicate UAW/NRW at 20% to 40%	3
WSA has developed reliable water balance and results indicate UAW/NRW at more than 40%	2
WSA has no water balance. Is currently developing one	1
WSA has no water balance	0

The development of a “Standard” water balance is considered one of the most important issues to be addressed as part of any WDM programme and in this regard it is recommended that the standard International Water Association (IWA) water balance is used. Full details of the IWA water balance are provided by Seago and Mckenzie, (2007) and a model (Aqualite) is already freely available from the WRC which can be used to develop such a balance (WRC, 2009).

The value of completing a standard water balance cannot be overstated as it effectively summarises where all water is being used in any water supply system. The water balance clearly shows how much water is being used and how much is being lost both in the form of Unaccounted for Water (UAW or UFW) as well as the currently preferred term of Non-Revenue Water (NRW). NRW has become the preferred term for identifying water losses and is now used in preference to the UAW or UFW term which can be manipulated to some extent and is therefore prone to error or subjective judgment.

South Africa is one of several countries in the world that has been pro-active in supporting and encouraging the use of the IWA water balance for all water suppliers in the country. Several reports and studies have been undertaken through either the WRC or the DWA in this regard and each year the overall water balance assessment for South Africa becomes more reliable and complete. The most recent estimate of Non-Revenue Water suggests that it is in the order of 35% of the total water supplied to municipalities. This is in line with the world average and is high when compared to other developed countries and low when compared to other developing countries.

3.2. PRESSURISED SUPPLY

2. Pressurised Supply to all consumers 100% of time	Score
WSA maintains a pressurised supply to all areas within the water distribution network all of the time at a minimum of 20m pressure	4
WSA maintains a pressurised supply to all areas within the water distribution network however pressure drops below 10m in certain areas	3
Small isolated sections of the network experience intermittent supply	2
Many sections of the network experience intermittent supply	1
The entire network experiences intermittent supply	0

While most residents in South Africa take a 24-hour pressurized supply for granted, particularly in the main urban centres, many people do not share the benefits of such a first world water supply. In some cases, the water supply systems are not being maintained properly with the result that large areas previously under 24-hour pressurised supply are experiencing intermittent supply. This is an extremely worrying issue in South Africa and it is for this reason that one of the key issues addressed in the Scorecard is the provision of a 24-hour pressurised supply to all customers of all water suppliers throughout the country.

South Africa, currently has a very strong water supply infrastructure and one that can provide potable water to most consumers all of the time. In cases, where a 24-hour supply is not being provided, the potential for the spread of water borne diseases such as Typhoid and Cholera is very high. Action must therefore be taken in any instances where intermittent supply is the norm to restore the water supply to a fully pressurised supply as a matter of priority.

It should be noted that South Africa tends to offer a very high level of service in most of the urban water supply systems with average water pressures in the order of 50 m (5 bar). This is similar to the pressure offered in most developed countries and is of a higher standard than in most other developing countries.

3.3. RESIDENTIAL METERING

3. Residential Metering System	Score
More than 98% of all connections are metered and billed.	4
75% to 98% of all connections are metered and billed	3
50 - 75% of connections are metered and billed	2
Less than 50% of connections are metered and billed	1
No metering takes place	0

Residential metering is normally a prerequisite for billing of water use based on the quantity used by each consumer. Such billing is one of the key issues normally included in any detailed WDM strategy. South Africa is relatively progressive with regard to consumer metering and in most instances the quality of residential water meters used by most water suppliers is very high which in turn has a positive influence on the water losses. In most cases, the water accounts sent to the residents is based on the actual water used and measured by the residential meter. In some instances, however, accounts are either not sent out at all or are based on an assumed flat rate monthly water use, typically about 20 kl/per property. In such cases, the actual water use is often much higher and the flat rate assumption is therefore very inaccurate. It is important for all water suppliers to strive towards properly metered water consumption for all customers and water billing that is based on accurate metered consumption.

It should be noted that the issue of residential metering is often more complex than simply identifying the number of connections that are metered. The quality of the meters is very important as is the accuracy of the meters which in turn is influenced to some degree by the replacement policy. Many water suppliers replace domestic meters at intervals of between 5 and 8 years while others do not replace such meters until they cease recording with the result that they may be under-recording significantly without the water supplier realizing that there is any problem. There is virtually a science surrounding meter accuracy and when meters should be replaced to minimize losses and maximize revenues. While these issues are indeed very important, they are currently not addressed in this scorecard which concentrates on only 25 specific issues.

3.4. NON RESIDENTIAL METERING

4. Non Residential Meters (Commercial, Industrial and Institutional)	Score
More than 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use.	4
75% to 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use	3
50 - 75% of non-residential connections, including fire supply connections, are metered and billed based on metered use	2
Less than 50% of non-residential connections, including fire supply connections, are metered and billed based on metered use	1
No non-residential metering takes place	0

Non residential metering refers to the metering associate with all other connections to the water reticulation that are not specifically for domestic use. Such meters will therefore include industrial users, commercial users, all fire connections, parks and recreational areas and all municipal and government buildings. Such customer connections are extremely important to any water service provider as they often represent customers who are capable and willing to pay for the water consumed and in many cases they represent the main water users in the system. It is therefore critically important that a water service provider manages and maintains all non-residential meters as a matter of high priority.

For the purpose of any WDM Strategy, it has been found through experience, that special attention should be placed on the metering of all non-residential customers and that they are addressed separately from the domestic customers. Regular checks should be undertaken for all non-residential customers to ensure that all water being used passes through the customer meter including any fire connections associated with the customer. The meters should be checked for accuracy on a regular basis and replaced at regular intervals since even a small under-registration can lead to a large loss in revenue to the water service provider. From practical experience in South Africa, the auditing of non-residential meters in the water reticulation has been identified as one of the key WDM interventions that should be considered in any WDM strategy as it tends to have a very attractive pay-back period.

3.5. EFFECTIVE BILLING SYSTEM

5. Effective Billing System & Informative Billing	Score
WSA produces informative billing to all customers based on meter readings	4
WSA produces informative billing to most customers based on meter readings	3
WSA produces informative billing to only some customers based on meter readings	2
WSA has an uninformative billing system in place	1
WSA has no billing	0

Although metering is a critical element of any water supply business, it is equally important to have an effective billing system in place and in this regard one of the issues included in the Scorecard relates to the implementation of an Informative Billing System. It has been found that the provision of water accounts with details of water consumption as well as the step-tariffs is an important element of any effective WDM strategy.

This item on the Scorecard has been simplified to address only the key issue of informative billing and could easily be expanded to include additional issues such as the step-tariffs, etc. Although most water supply managers appreciate the benefits of informative billing as a prerequisite to an efficient billing process, it is often not implemented by the utility due to the fact that such billing may require a complete restructuring of the accounting system. Many municipalities are therefore unable or unwilling to implement informative billing procedures since they do not wish to incur additional costs associated with upgrading the billing system.

One of the best examples of informative billing in South Africa was provided by the Hermanus Municipality in the Western Cape. Their system was held up as “best practice” in South Africa for many years although it would appear to have been discontinued in recent years. Such systems should be encouraged and be used to assist with the implementation of proper WDM interventions throughout South Africa.

3.6. LEAKAGE COMPLAINTS SYSTEM

6. Network (Leakage) Complaints System	Score
Efficient reporting system in place (90% of reported leaks are repaired within 24 hours)	4
Efficient reporting system in place (90% of reported leaks are repaired within 48 hours)	3
Leakage reporting system in place response times need to be improved.	2
Leakage reporting system in place but few if any field response teams to undertake repairs.	1
No leakage reporting system in place and no plans to create one.	0

Leakage is often regarded as the main cause of non-revenue water from a water supply system. In many countries around the world, leakage is virtually the only issue addressed under the water supplier's WDM initiatives and very little attention is paid to any of the other issues. In order to address leakage it is important to identify the key sources of the leakage since different actions are required to address road leaks for example compared to internal household leakage.

The objective of a Network Leakage Complaints System is specifically to address leakage that occurs before the customer meter on the Municipality's reticulation network. Such leaks will typically include leaks on the water mains, connections, fire hydrants, valves, storage reservoirs, etc. It is important for any well managed system that the general public are able to report such leaks at any time of the day with ease. This in turn requires a proper Leak reporting System to be in place and for the water service provider to act swiftly to address all reported leaks. This apparently simple task requires an integrated system involving a Leak Reporting Centre supported by teams to undertake the leak location and subsequent repair.

In most well managed systems, the repair of all reported leaks will be undertaken within 24 hours while less efficient organisations will take longer. As water becomes more expensive and pressure is placed on all suppliers to reduce leakage of all forms, this item will become a more significant part of any integrated WDM Strategy.

3.7. BILLING AND METERING COMPLAINTS SYSTEM

7. Billing and Metering Complaints System	Score
Efficient reporting system for metering and billing problems in place (90% dealt with within 14 days)	4
Efficient reporting system for metering and billing problems in place (90% dealt with within one month)	3
Metering and billing problem reporting system in place response times need to be improved	2
Metering and billing problem reporting system in place but very poor response time with many problems never resolved	1
No Metering and billing problem reporting system in place	0

While it is recognised that a leak reporting system is one of the key elements of a WDM system, it is also important for the water supplier to deal with other customer complaints associated with the meter reading and billing process. Problems with the meter reading and subsequent billing process will in turn lead to lower levels of payment which leads to higher household leakage and a vicious cycle thus occurs. In order to provide a reliable metering and billing system it is also necessary to support these activities with an efficient Customer Complaints System to deal with all metering and billing problems.

While it is recognised that it is often impossible to deal with metering and billing complaints within 24-hours, it is possible to address such complaints within a week or two and in this regard the Scorecard considers 14 days to be an acceptable time over which to address these complaints.

In many municipalities all water related complaints whether leakage or billing are referred to a single complaints system from which the appropriate section within the water service provider's organisation is contacted to deal with the complaint. It is important that such a system is available 24 hours a day and 7 days a week and that all complaints are recorded courteously and efficiently. In many cases, the complaints are recorded for quality control purposes as to enable the initial conversation to be reviewed at a later stage in the event of a follow-up call suggesting that the original complaint was not resolved.

3.8. ASSET REGISTER

8. Asset Register for Water Reticulation System	Score
WSA has a comprehensive and accurate asset register in place which is available digitally	4
WSA has a partially completed accurate asset register in place	3
WSA has a poor asset register in place	2
SA is in the process of developing an asset register	1
WSA has no asset register in place and no immediate intention of generating an asset register	0

Asset Management is becoming one of the most important issues to be addressed by all water service providers due to the fact that the lack of proper maintenance of the water supply system has been highlighted as a main cause for poor service delivery. Research in South Africa has shown that very few Water Service Providers have a proper asset management system in place and few even know the full value of the assets under their control. Before any detailed Asset Management System can be implemented, it is first necessary to know what assets are in the system and their value. In this regard, the first step is to develop a reliable Asset Register which should identify and quantify in terms of replacement costs every component of infrastructure and equipment (including software, etc.) associated with the water supply reticulation.

A reliable Asset register is therefore considered to be an important item in any WDM Strategy and for this reason has been included as one of the 25 key issues addressed in the Scorecard. Ideally, any Asset Register should be available in digital form and where possible linked into an appropriate Graphical Information System (GIS). Such systems are readily available from many companies offering water supply management software and each water service provider will have its own preference of what system it wishes to adopt depending on the size of the system and the budget available. A complex “do everything” system can cost many millions of rands to implement while smaller less complicated systems can often be obtained free of charge from various Government Organisations such as the Water Research Commission or the Department of Water Affairs.

3.9. ASSET MANAGEMENT: CAPITAL WORKS

9. Asset Management - Capital Works	Score
2% or more of the value of the water network is invested annually into new capital works related to the existing infrastructure	4
1% - 2% of the value of the water network is invested annually into new capital works related to the existing infrastructure	3
Less than 1% of the value of the water network is invested annually into new capital works related to the existing infrastructure	2
No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on new Capital Works	1
No estimate of asset value of water supply system is available and WSA feels that insufficient budget is spent on new Capital Works	0

Water supply networks are typically designed to last 50 years or more which implies that 2% of the system should be replaced every year. Obviously some components of a water reticulation network may last more than 50 years while others may last less than 50 years depending on the quality of the components, the water quality and the manner in which the system is operated. On average, however, it is appropriate to replace 2% of the network annually in the form of Capital Works. It is important to differentiate between pipe replacement and pipe maintenance and the maintenance issue is covered separately under the next item since most water suppliers have a separate budget for Capital Works and Operations/Maintenance.

It is therefore important to estimate the total value (replacement cost) of the water supply network annually from which the 2% budget for new Capital Works can then be calculated. The Capital Works budget can easily be in the order of 30% or more of the total annual budget for a typical water supplier and so it is an extremely important issue.

In South Africa, many water service providers do not know the replacement value of their water supply infrastructure and of those that do, very few allocate 2% to new Capital Works. This is leading to a gradual deterioration in the quality of many water supply systems countrywide and is of major concern to Government. It should be noted that in order to score 2 or more points in this item, the WSA must have knowledge of the asset value of the water supply system. A score of 1 is allocated in cases where the WSA considers that it is spending sufficient funds on asset management although it does not actually know the value of the reticulation system.

3.10. ASSET MANAGEMENT : OPERATIONS AND MAINTENANCE

10. Asset Management - Operations and Maintenance	Score
2% or more of the value of the water network is invested annually into the maintenance of the existing infrastructure	4
1% - 2% of the value of the water network is invested annually into the maintenance of the existing infrastructure	3
Less than 1% of the value of the water network is invested annually into the maintenance of the existing infrastructure	2
No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on operations and maintenance	1
No estimate of asset value of water supply system is available and WSA feels that insufficient budget is spent on operations and maintenance	0

As mentioned in the previous item, most water suppliers operate a Capital Works budget and an Operations and Maintenance budget. The Capital Works budget is typically in the order of 2% of the replacement value of the system while the Operations and Maintenance budget can often be off similar value. In the case of the Scorecard, the ideal rating is based on 2% of the replacement value of the system with lower investment attracting a lower score on the Scorecard.

The Operations and Maintenance budget is the budget allocated to running and repairing the system including the payroll costs for all staff operating the water reticulation system. Care should be taken to exclude the costs associated with the sewage and or stormwater systems which are again separate issues and not included in this item. The operations and maintenance item covers all leak location and repair activities, all metering activities, all logging and monitoring activities, as well as customer support and billing activities. In effect, this item covers the full operating budget for the water supply activities excluding any new Capital Works.

The main problem associated with this issue is often separating the Capital Works from the Operations and Maintenance since in some cases, new meters and/or valves, etc. are provided under the Maintenance budget and not the Capital budget. In general it is often easier to assess the total budget allocated to both Capital Works as well as Operations and Maintenance and agree on a realistic split between the two issues as suggested by the water supplier. The resulting figures will be sufficiently accurate for the Scorecard assessment.

3.11. DEDICATED WDM SUPPORT

11. Dedicated WDM support	Score
Efficient WDM Section in place with sufficient resources	4
WDM section in place requires some resources and capacity building	3
WDM section in place. Major resources and capacity building required	2
No WDM section currently in place, intention to create WDM section	1
No WDM Section and no intention to create WDM section	0

In order to implement a meaningful WDM Strategy, it is necessary for a Water Service Provider to run and operate a dedicated WDM section within the utility. Such a section will vary in size according to the size of the supply area and can vary from a single individual making use of external specialists to a full section using its own expertise and equipment for all WDM functions.

A fully functional WDM section should be able to deal with every item included in this Scorecard assessment which involves a full range of both technical as well as social issues. Most water service providers will not be able to address every issue from its permanent staff and it will often be necessary to utilise some external specialists on a contract or add-hoc basis. This is often the most practical approach as it enables the water service provider to gain access to the latest techniques and equipment without having to cover the costs of supporting such expertise when it is not required. A typical example of this situation would cover the use of the latest acoustic noise logging equipment or the “Smart Ball” in order to identify leaks on large water mains. Such equipment tends to be very expensive and is often only needed in special circumstances. In such cases it is more cost effective to bring in an external specialist with the necessary equipment as opposed to purchasing and maintaining such equipment permanently.

It is therefore possible to run and operate an efficient WDM capability within a water service provider using only a single competent WDM Manager supported by numerous external specialists when required.

3.12. ACTIVE LEAKAGE CONTROL

12. Active Leakage Control	Score
Active leakage detection and repair undertaken continuously with average sweep time of 12 months or less	4
Active leakage detection and repair undertaken continuously with average sweep time of 48 months	3
Active leakage detection and repair is undertaken on an add-hoc basis	2
No active leakage detection is currently undertaken however the WSA intends to initiate such measures	1
No active leakage detection is undertaken and the WSA has no intention to conduct such measures	0

Active leakage control is the term used to describe the action of searching a water supply network for unreported leaks – in effect “leak location”. Whether such actions are necessary is a debatable issue and it will depend to a great degree on the soil conditions and condition of infrastructure. In cases where the water pipes are located close to the surface, it is often the case that leaks will tend to surface where they become “visible leaks” which are then quickly identified and repaired. In other cases, the pipes may be relatively deep or the ground conditions may be such that a leak will not surface and in such circumstances, the only practical approach to combating the leakage is to undertake Active Leakage Control measures periodically. Active Leakage Control therefore involves the process of examining a water reticulation system every year or 2 years for underground/unreported leaks.

The process of Active Leakage Control can be undertaken at a relatively simple level or at a very complicated level depending on the characteristics of the specific water supply network. In a large urban system where most of the pipes are buried below tarred road surfaces, it is often necessary to utilize more expensive equipment in order to pinpoint the leaks and reduce the size of the resulting excavation. In more rural systems, simpler and less expensive equipment can be employed since it is often possible to excavate the pipeline without causing major traffic disruption. In all cases, it is always cost effective to undertake a very preliminary sweep of the network visually to identify and repair all leaks which have surfaced but have not been reported. This activity is usually a prerequisite for most of the more elaborate and expensive sounding techniques.

3.13. SECTORISATION

13. Effective Sectorisation	Score
Reticulation network has been sectorised and is checked regularly to maintain discrete zones	4
Reticulation network has been sectorised but is not checked regularly to ensure discrete zones	3
Only portions of the reticulation network have been sectorised	2
Few if any zones have been created but plans are in place to sectorise the system	1
No sectorisation has been undertaken and no plans are in place to implement such measures	0

Sectorisation is the process of splitting a large water supply area into smaller more manageable areas in which it becomes possible to identify areas with unusually high levels of leakage. In very large water supply areas, it is difficult to know where the key problems lie without first cutting the area up into manageable portions, each of which should ideally be supplied through a management meter. Such a meter is not used to create an account but is purely to assist the water managers to get a full picture of how much water is being supplied to an area with special attention to the water supplied during the period of “Minimum Night Flow”.

The greatest problem experienced by a water supplier associated with sectorisation is the maintenance of the sectors. This is a world-wide problem and one that can be managed but never eliminated. No sooner have sectors or zones been created than they are compromised through the opening or closing of valves within the network after which the system no longer performs as it was originally intended. It is therefore essential when creating sectors or zones in a network that they are checked regularly to ensure that they are still discrete and operating as they were designed.

A water supply system with properly designed and operated sectors/zones will provide the managers with very valuable information which assists with the identification of high leakage areas, high pressure areas and generally any problem areas. The management meters are also used to assess the level of Minimum Night Flow entering an area which in turn is used to assess the level of leakage in the area – one of the most useful aspects of any WDM strategy.

3.14. BULK METER MANAGEMENT

14. Effective Bulk Meter Management	Score
All bulk water sources to the WSA are metered by the WSA using some form of check metering (either permanent or temporary)	4
All bulk water sources to the WSA are metered by the Bulk water supplier or by the WSA	3
Few bulk meters are operational	2
No Bulk metering in place, however, WSA has plans to install bulk meters	1
No Bulk metering in place and no plans for such meters have been made	0

Bulk management meters are the large water meters measuring all bulk supplies into or out of a water supply system. Such meters provide the water supplied to an area as well as any bulk water transferred to an adjacent supply area and the meter readings in turn provide the basis for the detailed water balance. It is important to ensure that all bulk water meters are accurate and in this regard they should be checked and serviced at regular intervals since even a small under-recording can greatly exceed the cost of a new meter or new meter head.

There is some debate concerning the type of meter that should be used for bulk metering with some water service providers opting to use the older design of mechanical meters while others opt for the more sophisticated electro-magnetic flow meters. There is no simple answer to this debate and in some cases, mechanical meters are appropriate while in others the electro-magnetic meters are the better option. Much depends on the specific application and various other factors which all play a role in the selection process. Factors that should be considered include, reliability/availability of power supply, incidence of lightning, proximity of the nearest service/calibration centre, water quality and incidence of foreign objects, accuracy required, and technical competence of technical personnel in the water utility. Each of these issues and many more must be considered when selecting the type of bulk meter to be used and in many cases the final decision rests with the water supply manager who often has a strong view on the issue.

3.15. ZONE METER MANAGEMENT

15. Effective Zone Meter Management and Assessment of Minimum Night Flows	Score
All inlet points to discrete zones are metered and accurate with Minimum Night Flows logged and analysed on a regular basis	4
All inlet points to discrete zones are metered and accurate but no Minimum Night Flow analyses are undertaken	3
All inlet points to discrete zones are metered but many are broken or considered to be inaccurate	2
Zone inputs are currently not metered although the WSA has planned to install meters on all zone inlets	1
No accurate zone metering is in place and there are no plans to introduce such measures	0

Zone meter management is aimed at helping the WSA managers to assess the key problem areas by measuring and monitoring the flows and pressures into each zone. Zone management is one of the key duties of a water supply manager and without the monitoring and evaluation of zone inflows it is almost impossible to provide effective management and operation of a system. The zone management meters are normally not used for any billing processes but rather to assess the Minimum Night Flows and to identify any pressure problems.

The assessment of the Minimum Night Flows is possibly one of the most useful checks that can be undertaken by a water supply manager as it is often able to highlight a number of important issues. For example, the Minimum Night Flow will identify high levels of leakage in cases where the zone is discrete and the Minimum Night Flow is realistic. In other cases, the Minimum Night Flow may drop to zero (or even negative flow) which is often an indication of an open cross boundary connection. Unfortunately very few water suppliers actually know how to interpret the Minimum Night Flows properly and the results presented in reports or on the internet sites designed to highlight that the zone is being well managed do in fact show that the zone is not being properly managed. It is therefore very important for the water supply managers to understand how to interpret the graphs showing the supply into each zone and the constant monitoring of such graphs will help to provide effective management.

3.16. PRESSURE MANAGEMENT

16. Pressure Management and Maintenance of Pressure Reducing Valves	Score
Reticulation is comprehensively sectorised into pressure zones which are all discrete. All PRV's are maintained under maintenance schedule.	4
Reticulation is comprehensively sectorised into pressure zones which are all discrete. PRV's are only maintained when problems become apparent	3
Reticulation is sectorised in pressure zones but the zones are not verified and little or no maintenance is undertaken on the PRVs	2
WSA intends to introduce pressure zones and the use of PRVs to manage system pressures	1
No Discrete pressure zones and no PRV maintenance	0

Pressure management is one of the key Water demand Management interventions and is also one of the most under-rated issues facing most WSA's. Great progress in the field of pressure management has been made over the past 15 years since the introduction of Advanced Pressure Control in the UK in the early 1990's. Although pressure management is not always possible to introduce in many water supply systems, it has been found that it is able to deliver impressive savings through reduced leakage in areas with abnormally high losses. This is particularly relevant in South Africa where the typical water reticulation networks are often at relatively high pressures of 50m or more and levels of leakage and/or wastage are also very high.

Some of the largest and most successful advanced pressure control installations in the world have been constructed and commissioned in South Africa. The savings achieved are spectacular and in some cases have now been operating successfully for over 10 years which clearly demonstrates that the savings can be sustainable.

Pressure management can take a variety of forms and new equipment is being developed continually by almost every supplier or manufacturer of pressure reducing valves. From the experience gained in South Africa, it has been found that the equipment used is rarely the key issue. Instead, it has been found that the most important issue is to ensure that the zone is operating properly before any new equipment is installed. Ensuring that the zone is operating properly is often a lengthy and expensive process involving considerable effort to ensure that all pipes and boundary valves are fully operational.

3.17. AS BUILT DRAWINGS

17. As-Built Drawings of Bulk and Reticulation Infrastructure	Score
Accurate as-built drawings for all reticulation are available digitally	4
As-build drawings available digitally for the majority of the network and available in hard copy for the remainder of the network	3
A mixture of digital and hard copy as-built drawings available for the majority of the network but many problems are known to exist with the quality of the data	2
Only some hard copy as-built drawings are available for portions of the network	1
No as-built drawings available	0

Most WSAs will indicate that they have proper drawings of their water supply network showing all pipes and ground levels, etc. On closer inspection, however, it is often found that the claims are at best exaggerated as the drawings often reflect the original designs and do not always show the actual pipes as they have been laid. The importance of proper “as-built” drawings cannot be overstated and are essential for the proper management and operation of any water supply system.

Unfortunately relatively few WSAs take the time and effort to verify the pipe network and simply assume that what is shown on the available drawings is what they have in the ground. Discrepancies are often only identified when problems occur such as a burst pipe which for some reason cannot be isolated or an area that experiences water pressure problems when the network analysis model predicts no problems.

There is no quick and simple remedy to address problems with the “as-built” drawings and in cases where problems are thought to exist, it is often necessary to send in field staff to locate and identify every pipe and valve in the system. This process can be time-consuming and expensive but is often necessary in order to gain a full understanding of the water reticulation system which in turn is also needed for any proper asset management system. In extreme cases, excavators are needed to dig trenches in order to find and quantify pipes in the ground and often the situation in the ground is not as expected. Ideally, any ground investigations should be undertaken using GPSs in order to capture the network digitally.

3.18. SCHEMATIC LAYOUT OF RETICULATION

18. Schematic Layout of Water Infrastructure	Score
An up-to date and detailed schematic of the whole bulk reticulation network is available showing all bulk mains, pumps, reservoirs, meters and control valves	4
A detailed schematic of the bulk reticulation network is available but is known to be outdated and/or inaccurate	3
Only a rough schematic of the bulk reticulation network is available which is known to be inaccurate and/or outdated	2
No schematic of the bulk reticulation is available although the WSA is planning to develop such a schematic	1
No schematic of the bulk reticulation is available and the WSA has no plans to develop such a schematic	0

Many WSAs use GIS systems to provide drawings of the water reticulation networks which show the locations and sizes of all pipes, valves, reservoirs, etc. as they are located on plan. The problem with such drawings is that they tend to have clusters of valves and reservoirs in a small section of the drawing which have so much detail that they are very confusing and tend to be difficult to understand. From practical experience, it has been found that a well designed schematic drawing showing all of the key pipes, valves and reservoirs, etc. is often one of the most useful drawings a WSA can develop. Such drawings are not drawn to scale but rather drawn to highlight and simplify the network. Areas where the detail is clustered on the main GIS drawings can therefore be expanded to clarify the layout of the pipelines and all valves and meters can be clearly labeled and numbered.

A proper schematic drawing of a water supply system is therefore considered to be a pre-requisite for the effective management and operation of the systems. Colour coding and the use of symbols to represent different items such as boundary valves, pressure reducing valves, reservoirs, pumps, and water meters, etc. makes the schematic drawings very clear and of great value to any WSA.

It should be noted, that no complicated or expensive software is needed to create such schematics and it is possible to use software that is generally readily available in all organisations such as Excel, Powerpoint, etc. A proper schematic drawing is again an integral component of any Asset Management system and is usually developed in addition to the normal GIS drawings and not instead of the GIS drawings. Both sets of drawings have their place.

3.19. REGULATIONS AND BYLAWS

19. Regulations and Bylaws	Score
Regulations and Bylaws are in place which address WDM issues and some form of enforcement is undertaken.	4
Regulations and Bylaws are in place which address WDM issues but are not enforced.	3
Regulations and Bylaws are in place but do not address WDM issues.	2
There are no Bylaws in place but WSA is intending to introduce such measures.	1
There are no Bylaws in place and WSA has no plans to introduce them.	0

Most WSAs are required to implement some form of Bylaws relating to the water supply and various standard templates are available to assist WSAs in developing proper Bylaws that meet the requirements of the regulator. In recent years, it has become necessary to include various clauses which help to address Water Demand Management issues although the exact content of such clauses is generally left to the discretion of the WSA.

Even in cases where Water Demand Management issues are covered under the Municipal By-laws, relatively few municipalities actually enforce such by-laws and water wastage often goes unpunished. As the cost of water rises and the availability of water decreases, this will become a more important issue in future and enforcement of the by-laws will become the norm rather than then exception.

From discussion with many municipalities throughout South Africa, it is clear that the trend of reducing water inspectors has continued for many years to such an extent that very few municipalities employ such inspectors. The enforcement of the by-laws on any aspect of water use efficiency is therefore non-existent in most parts of the country with the odd exception. As water becomes more precious this trend will hopefully be reversed and action will be taken to prevent water being wasted in the municipalities. Unfortunately this may take some time to achieve as it also requires a change in mind-set of the Municipal Managers and their water supply managers, many of whom are currently unwilling to take decisions that may be unpopular with the residents.

3.20. TARIFFS

20. Tariffs	Score
WSA has rising block tariffs in place that encourage water use efficiency	4
WSA has rising block tariffs in place but they do not encourage water use efficiency sufficiently.	3
WSA has single water tariff in place	2
WSA has a declining block tariff in place	1
WSA does not know what tariff structure is in place	0

Water Tariffs are an important part of any successful WSA since without a proper tariff policy and efficient cost recovery, the WSA will be unable to provide a sustainable service. The issue of cost recovery is very important but is not considered to fall under the Water Demand Management side of the business and is therefore not specifically addressed as part of the scorecard. The Tariffs used to generate the accounts, however, can be tailored specifically to encourage water use efficiency or they can be structured in such a manner that they actually discourage water use efficiency. For this reason, the tariffs used by the WSA are included as a key item on the scorecard.

In order to encourage water use efficiency, the water tariffs should be structured in such a manner that the water becomes progressively more expensive as use increases. The first 6 m³ of water used in any month is often provided free of charge after which the next 14 m³ would be at a relatively low cost to assist the poorer members of the communities. Water use in excess of approximately 20 m³ should then be significantly more expensive to discourage water use above this level since such use will normally be due to garden irrigation and/or swimming pools. It would be very unusual for a normal household to use more than 20 m³/month unless water is being used to irrigate garden areas or to refill a swimming pool – both of which are considered to be non-essential items and therefore such water should be charged at a significant premium. This form of rising block tariffs is an effective Water demand Management measure and in many parts of Southern Africa, the cost of water in excess of the norm (e.g. 20 m³/month) is sometimes in excess of R20 m³ which provides a real incentive to use water sparingly.

3.21. TECHNICAL SUPPORT TO CUSTOMERS

21. Technical Support to Customers	Score
The WSA actively engages with customers and offers technical support on WDM to both domestic as well as commercial/industrial customers	4
The WSA offers technical support on WDM to large consumers on a pro-active basis	3
The WSA only offers technical support on WDM on a reactive basis	2
The WSA currently offers no technical support but plans to introduce a support mechanism	1
The WSA has no plans to offer technical support on WDM measures to any customers	0

Although it is possibly the exception rather than the norm in South Africa, the provision of proper technical support to consumers with regard to Water Demand Management is considered an important issue and one that should be considered by all WSP's. While it may not be practical to offer a comprehensive service in many of the smaller municipalities, it is still possible to provide some level of assistance through regular newsletters and brochures, etc. Most of the larger municipalities and metros have dedicated personnel supporting their Water Demand Management activities and they are often willing to share much of their materials with smaller organisations which do not have the resources to develop materials for themselves. Even the Department of Water Affairs is often willing to assist in such cases to help educate water users on how to improve their water use efficiency and such help is often provided at no cost to the Municipality.

The level of support provided to a water user will vary depending on the type of user and the specific circumstances surrounding the water use. Some municipalities may offer a pro-active service where they initiate the contact and visit the users while others may offer a reactive service where they will only respond to a specific request for help.

3.22. UNLAWFUL CONNECTIONS

22. Removal of Unlawful Connections	Score
The WSA actively monitors and removes all unlawful connections	4
The WSA selectively monitors and removes unlawful connections	3
The WSA monitors unlawful connections but has no policy for removal	2
The WSA plans to introduce measures to tackle unlawful connections	1
The WSA has no plans to deal with unlawful connections	0

In South Africa the introduction of the “free basic water” allowance to all citizens has helped to reduce the number of illegal connections throughout the country since in most cases residents have no need to steal water when it is being provided free of charge. Unfortunately there will always be some people who still try to steal water for one reason or another and there will always be some unlawful connections in every water supply system. The problem of unlawful connections is not considered to be a significant issue in most parts of the country although there are isolated pockets where unlawful connections are known to be a problem.

Although the number of unlawful connections is considered to be relatively small in most water supply systems, it is nonetheless considered important for the WSA to have some formal policy for dealing with this issue. For this reason the issue of unlawful connections is one of the 25 key issues considered in this scorecard. Some of the larger water suppliers have a very well structured and pragmatic approach on dealing with unlawful connections while others have little knowledge of the size of the problem in their water supply area. The points allocated in this item therefore reflect the manner in which the water supplier deals with the problem.

3.23. COMMUNITY AWARENESS AND EDUCATION

23. Community Awareness and Education Programmes	Score
WSA is actively involved in conducting workshops on water conservation within the communities with a dedicated team	4
WSA is involved in conducting workshops on water conservation within the communities however no dedicated team exists	3
WSA has very little involvement with workshops on water conservation within the communities	2
WSA currently does not conduct workshops on water conservation within the communities, however these interventions are proposed	1
WSA currently does not conduct workshops on water conservation within the communities	0

Community awareness and education with regard to water use efficiency is one of the most important issues which must be addressed by all WSPs. It is also the issue which is most often completely ignored by many WSPs and in such cases major problems will invariably occur when any technical Water Demand Management interventions are introduced. From past experience it is clearly evident that even the most innovative and well planned Water demand Management interventions will fail if they do not have the full support of the communities they serve. It is for this reason that the community awareness and education process is considered an essential element of any technical intervention.

From past experience in many parts of South Africa, it has been found that in most cases, the communities are very supportive of any new measures which help to conserve water and improve water use efficiency. A key element of such awareness programmes is full and open public debate and discussion on the proposed technical interventions before they are implemented. Such meetings often raise important issues that may have been ignored or overlooked which can have a critical influence on the viability of the intervention. Considerable help is available to those wishing to present awareness programmes in the form of presentation materials as well as information leaflets on how to use water efficiently. Such materials can often be obtained freely from various organisations such as the Department of Water Affairs or the Water Research Commission. Using existing materials will greatly assist with the community awareness and education programmes as it will eliminate the need to start from scratch and develop new materials for each ne project.

3.24. SCHOOLS AWARENESS AND EDUCATION

24. Schools Awareness and Education Programmes	Score
WSA is actively involved in conducting workshops on water conservation within the schools with a dedicated team	4
WSA is involved in conducting workshops on water conservation within the schools however no dedicated team exists'	3
WSA has very little involvement with workshops on water conservation within the schools	2
WSA currently does not conduct workshops on water conservation within the schools, however these interventions are proposed	1
WSA currently does not conduct workshops on water conservation within the schools	0

Providing education and awareness on Water Demand Management at school level is a specific issue on its own and has been allocated as one of the 25 items in the scorecard. Education scholars is one of the best approaches to the promotion of water use efficiency in the community as they are more receptive to new ideas and readily adopt measures which will help to protect their future. Once again, many materials have already been designed to assist with the schools awareness programmes and it should not be necessary to create new materials from scratch. Several government departments as well as many Municipal departments have created very useful and informative training materials that can be used as the backbone of any Schools Awareness Programme.

When dealing with scholars, the approach adopted is not the same as that used for the public meetings as discussed in the previous item. The schools programme has to be tailored to be both interesting and educational at the same time and usually involves some form of project which can be undertaken by individuals or groups within the school. It is often possible to introduce a "Schools Competition" in which all of the schools in the selected area compete against each other to try and show the greatest improvement in water use efficiency. Such projects have proved very successful in areas with few resources and the results achieved by some of the schools have been very impressive especially in view of the lack of funds available to address some of the problem issues such as leaking taps and toilets, etc. The enthusiasm with which some of the schools have taken on the project is testament to the value of this type of awareness programme.

3.25. MEDIA AWARENESS PROGRAMMES

25. Newspaper & radio articles plus posters and leaflets for distribution	Score
WSA runs regular adds in newspapers and/or radio and has library of posters and leaflets for public distribution	4
WSA runs occasional adds in newspapers and/or radio and has library of posters and leaflets for public distribution	3
WSA has library of posters and leaflets for public distribution but does not advertise in newspapers or radio	2
WSA has some leaflets and/or posters and intends to strengthen its capacity to promote WC/WDM in the community	1
WSA does not advertise in newspapers or radio and has no posters or leaflets on WC/WDM	0

The final item in the Scorecard is also an item dealing with awareness with respect to WDM and more specifically the media coverage given to this issue. As part of any comprehensive awareness programme there is usually some involvement of media coverage such as television, newspaper and/or radio. The medium selected for the awareness programme should be appropriate to the audience being targeted. For example, in many low income areas, the best form of media coverage is the radio and/or local newspaper or even posters in the local municipal offices and clinics.. In other areas, the television is an appropriate although it is often prohibitively expensive and cannot be targeted at a specific local area since there are currently no local television channels in South Africa. Once local television is available in South Africa, the option of using it as the medium for disseminating information on Water Demand Management as part of a local awareness programme will become viable.

Many of the larger municipalities and metros already promote WDM through a variety of different media options and materials are often freely available to smaller municipalities which can then be modified easily and at little or no cost. Creating new leaflets and articles from scratch is an expensive process and all municipalities should check what is already available before investing in new material since it is likely that someone somewhere in South Africa has already developed materials similar to those needed. In addition, the Department of Water Affairs has an extensive library of materials which it is generally happy to provide to any Municipality wishing to promote WDM through an awareness programme. Many leaflets and posters are also available in different languages as used in the various provinces.

4. CONCLUSIONS

The Balanced Scorecard methodology is a very potent and powerful technique used to manage and monitor complicated business practices such as a water supply authority. A highly simplified version of the methodology has been used in South since 2002 and offers a quick and effective approach that can be used to create a WDM strategy for a water supply authority. The methodology is very simple and straightforward and can easily be tailored to suite a wide range of conditions in other parts of the world.

The WDM Balanced Scorecard model used in South Africa has recently been added to the suite of models available from the South African Water research Commission which are freely available to any water service provider or specialist wishing to reduce wastage from a water supply system. The models currently available include:

- AquaLite water balance model (WRC, 2007),
- PRESMAC Model (WRC, 2001) pressure management model
- SANFLOW (WRC, 1999) nightflow analysis model.

All of the models can be downloaded from the WRP web site or the South African Water Research Commission web site www.wrp.co.za or www.wrc.org.za respectively.

5. REFERENCES

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APPENDIX A

Printable Copy of WDM Scorecard

Municipal Scorecard for Assessing the Potential for WC/WDM Efforts in Municipalities

August 2010, Version 2.3



Basic Information

Name of Municipality/ Water Service Provider: _____

Additional details (if required): _____ Assessment Year: _____

Contact Details

Scorecard completed by

Name: _____ E-mail: _____

Tel: _____ Fax: _____

Section	Score
1. Development of Standard Water Balance	Score
WSA has developed reliable water balance and results indicate UAW/NRW at less than 20%	4
WSA has developed reliable water balance and results indicate UAW/NRW at 20% to 40%	3
WSA has developed reliable water balance and results indicate UAW/NRW at more than 40%	2
WSA has no water balance but is currently developing one	1
WSA has no water balance	0
2. Pressurised Supply to all consumers 100% of time	Score
WSA maintains a pressurised supply to all areas within the water distribution network all of the time at a minimum of 20m pressure	4
WSA maintains a pressurised supply to all areas within the water distribution network however pressure drops below 10m in certain areas	3
Small isolated sections of the network experience intermittent supply	2
Many sections of the network experience intermittent supply	1
The entire network experiences intermittent supply	0
3. Residential Metering System	Score
More than 98% of all connections are metered and billed.	4
75% and 98% of all connections are metered and billed	3
50 - 75% of connections are metered and billed	2
Less than 50% of connections are metered and billed	1
No metering takes place	0
4. Non Residential Meters (Commercial, Industrial and Institutional)	Score
More than 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use	4
75% to 98% of all non-residential connections, including fire supply connections, are metered and billed based on metered use	3
50 - 75% of non-residential connections, including fire supply connections, are metered and billed based on metered use	2
Less than 50% of non residential connections, including fire supply connections, are metered and billed based on metered use	1
No non-residential metering takes place	0
5. Effective Billing System & Informative Billing	Score
WSA produces informative billing to all customers based on meter readings	4
WSA produces informative billing to most customers based on meter readings	3
WSA produces informative billing to only some customers based on meter readings	2
WSA has an uninformative billing system in place	1
WSA has no billing system in place	0
6. Network (Leakage) Complaints System	Score
Efficient reporting system in place (90% of reported leaks are repaired within 24 hours)	4
Efficient reporting system in place (90% of reported leaks are repaired within 48 hours)	3
Leakage reporting system in place although response times need to be improved	2
Leakage reporting system in place but few if any field response teams available to undertake repairs	1
No leakage reporting system in place and no plans to create one	0
7. Billing and Metering Complaint System	Score
Efficient reporting system for metering and billing problems in place (90% dealt within 14 days)	4
Efficient reporting system for metering and billing problems in place (90% dealt with within one month)	3
Metering and billing problem reporting system in place response times need to be improved	2
Metering and billing problem reporting system in place but very poor response time with many problems never resolved	1
No Metering and billing problem reporting system in place	0

8. Asset Register for water Reticulation System	Score
WSA has a comprehensive and accurate asset register in place which is available digitally	4
WSA has a partially completed accurate asset register in place	3
WSA has a poor asset register in place	2
WSA is in the process of developing an asset register	1
WSA has no asset register in place and no immediate intention of generating one	0
9. Asset Management - Capital Works	Score
2% or more of the value of the water network is invested annually into new capital works related to the existing infrastructure	4
1% - 2% of the value of the water network is invested annually into new capital works related to the existing infrastructure	3
Less than 1% of the value of the water network is invested annually into new capital works related to the existing infrastructure	2
No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on new Capital Works	1
No estimate of asset value of water supply system is available and WSA feels that insufficient budget is spent on new Capital Works	0
10. Asset Management - Operations and Maintenance	Score
2% or more of the value of the water network is invested annually into the maintenance of the existing infrastructure	4
1% - 2% of the value of the water network is invested annually into the maintenance of the existing infrastructure	3
Less than 1% of the value of the water network is invested annually into the maintenance of the existing infrastructure	2
No estimate of asset value of water supply system is available but WSA feels that sufficient budget is spent on operations and maintenance	1
No estimate of asset value of water supply system is available but WSA feels that insufficient budget is spent on operations and maintenance	0
11. Dedicated WDM Support	Score
Efficient WDM Section in place with sufficient resources	4
WDM section in place requires some resources and capacity building	3
WDM section in place. Major resources and capacity building required	2
No WDM section currently in place, although it is in process of being created	1
No WDM Section and no intention to create WDM section	0
12. Active Leakage Control	Score
Active leakage detection and repair undertaken continuously with average sweep time of 12 months or less	4
Active leakage detection and repair undertaken continuously with average sweep time of 48 months or less	3
Active leakage detection and repair is undertaken on an add-hoc basis	2
No active leakage is currently undertaken, however, the WSA intends to initiate such measures	1
No active leakage detection is undertaken and the WSA has no intention to conduct such measures	0
13. Effective Sectorisation	Score
Reticulation network has been sectorised and is checked regularly to maintain discrete zones	4
Reticulation network has been sectorised but is not checked regularly to ensure discrete zones	3
Only portions of the reticulation network have been sectorised	2
Few if any zones have been created but plans are in place to sectorise the system	1
No sectorisation has been undertaken and no plans are in place to implement such measures	0
14. Effective Bulk Meter Management	Score
All bulk water sources to the WSA are metered by the WSA using some form of check metering(either permanent or temporary)	4
All bulk water sources to the WSA are metered by the Bulk water supplier or by the WSA	3
Few bulk water meters are operational	2
No Bulk Metering in place, however, WSA has plans to install bulk meters	1
No Bulk metering in place and no plans for such meters have been made	0
15. Effective Zone Meter Management and Assessment of minimum	Score
All inlet points to discrete zones are metered and accurate with Minimum Night Flows logged and analysed on a regular basis	4
All inlet points to discrete zones are metered and accurate but no Minimum Night Flow analyses are undertaken	3
All inlet points to discrete zones are metered but many are broken or considered to be inaccurate	2
Zone inputs are currently not metered although the WSA has planned to install meters on all zone inlets	1
No accurate zone metering is in place and there are no plans to introduce such measures	0
16. Pressure Management and Maintenance of Pressure Reducing Valves	Score
Reticulation is comprehensively sectorised into pressure zones which are all discrete. All PRV's are maintained under maintenance schedule	4
Reticulation is comprehensively sectorised into pressure zones which are all discrete. PRV's are only maintained when problems become apparent	3
Reticulation is sectorised in pressure zones but the zones are not verified and little or no maintenance is undertaken on the PRV's	2
WSA intend to introduce pressure zones and the use of PRV's to manage system pressures	1
No Discrete pressure zones and no PRV maintenance	0

17. As-built Drawings of Bulk and Reticulation Infrastructure	Score
<i>Accurate as-built drawings for all reticulation are available digitally</i>	4
<i>As-built drawings available digitally for the majority of the network and available in hard copy for the remainder of the network</i>	3
<i>A mixture of digital and hard copy as-built drawings available for the majority of the network but many problems are known to exist with the data quality</i>	2
<i>Only some hard copy as-built drawings are available for portions of the network</i>	1
<i>No as-built drawings available</i>	0
18. Schematic Layout of Water Infrastructure	Score
<i>An up-to date and detailed schematic of the whole bulk reticulation network is available</i>	4
<i>A detailed schematic of the bulk reticulation network is available but is known to be outdated and/or inaccurate</i>	3
<i>Only a rough schematic of the bulk reticulation network is available which is known to be inaccurate and/or outdated</i>	2
<i>No schematic of the bulk reticulation is available although the WSA is planning to develop such a schematic</i>	1
<i>No schematic of the bulk reticulation is available and the WSA has no plans to develop such a schematic</i>	0
19. Regulations and By-laws	Score
<i>Regulations and By-laws are in place which address WDM issues and some form of enforcement is undertaken</i>	4
<i>Regulations and By-laws are in place which address WDM issues but are not enforced</i>	3
<i>Regulations and By-laws are in place but do not address WDM issues</i>	2
<i>There are no By-laws in place but SA is intending to introduce such measures</i>	1
<i>There are no By-laws in place and WSA has no plans to introduce them</i>	0
20. Tariffs	Score
<i>WSA has rising block tariffs in place that encourage water use efficiency</i>	4
<i>WSA has rising block tariffs in place but they do not encourage water use efficiency sufficiently</i>	3
<i>WSA has single water tariff in place</i>	2
<i>WSA has a declining block tariff in place</i>	1
<i>WSA does not know what tariff structure is in place</i>	0
21. Technical Support to Customers	Score
<i>The WSA actively engages with customers and offers technical support on WDM to both domestic as well as commercial/industrial customers</i>	4
<i>The WSA offers technical support on WDM to large consumers on a pro-active basis</i>	3
<i>The WSA only offers technical support on WDM on a reactive basis</i>	2
<i>The WSA currently offers no technical support but plans to introduce a support mechanism</i>	1
<i>The WSA has no plans to offer technical support on WDM measures to any customer</i>	0
22. Removal of Unlawful Connections	Score
<i>The WSA actively monitors and removes all unlawful connections</i>	4
<i>The WSA selectively monitors and removes unlawful connections</i>	3
<i>The WSA monitors unlawful connections but has no policy for removal</i>	2
<i>The WSA plans to introduce measures to tackle unlawful connections</i>	1
<i>The WSA has no plans to deal with unlawful connections</i>	0
23. Community Awareness and Education Programmes	Score
<i>WSA is actively involved in conducting workshops on water conservation within the communities with a dedicated team</i>	4
<i>WSA is involved in conducting workshops on water conservation within the communities however no dedicated team exists</i>	3
<i>WSA has very little involvement with workshops on water conservation within the communities</i>	2
<i>WSA currently does not conduct workshops on water conservation within the communities, however these interventions are proposed</i>	1
<i>WSA currently does not conduct workshops on water conservation within the communities</i>	0
24. Schools Awareness and Education Programmes	Score
<i>WSA is actively involved in conducting workshops on water conservation within the schools with a dedicated team</i>	4
<i>WSA is involved in conducting workshops on water conservation within the schools however no dedicated team exists</i>	3
<i>WSA has very little involvement with workshops on water conservation within the schools</i>	2
<i>WSA currently does not conduct workshops on water conservation within the schools, however these interventions are proposed</i>	1
<i>WSA currently does not conduct workshops on water conservation within the schools</i>	0
25. Newspaper & radio articles plus posters and leaflets for distribution	Score
<i>WSA runs regular adds in newspapers and/or radio and has library of posters and leaflets for public distribution</i>	4
<i>WSA runs occasional adds in newspapers and/or radio and has library of posters and leaflets for public distribution</i>	3
<i>WSA has library of posters and leaflets for public distribution but does not advertise in newspapers or radio</i>	2
<i>WSA has some leaflets and/or posters and intends to strengthen its capacity to promote WC/WDM in the community</i>	1
<i>WSA does not advertise in newspapers or radio and has no posters or leaflets on WC/WDM</i>	0

"The purpose of the Municipal Scorecard for the assessment of Water supply systems is to ascertain the Status quo of these systems and evaluate the potential for Water Conservation / Water Demand Management (WC/WDM) measures to be implemented in these systems. The scorecard is designed to enable the Regulator (Department of Water Affairs) to assess the current situation regarding losses and levels of wastage in all water supply systems countrywide. The initiative will provide the mechanism whereby the DWA can identify areas where WC/WDM is not being addressed properly to ensure that appropriate measures are taken to encourage efficient use of water and the elimination of wastage. The scorecard is based on a number of key issues which all water service providers must address as part of normal management. The Scorecard will also identify areas of expertise and best practice which can be used to help other areas which are experiencing problems. The following table provides the items included in the Scorecard."

Name of Municipality/ Water Service Provider: _____

Item No.	Description	Points
1.	Development of Standard Water Balance	
2.	Pressurised supply to all consumers 100% of time	
3.	Residential Metering System	
4.	Non Residential Meters (Commercial, Industrial and Institutional)	
5.	Effective Billing System & Informative Billing	
6.	Network (Leakage) Complaints System	
7.	Billing and Metering Complaints System	
8.	Asset Register of Water Reticulation System	
9.	Asset Management - Capital Works	
10.	Asset Management - Operations and Maintenance	
11.	Dedicated WDM support	
12.	Active Leakage Control	
13.	Effective Sectorisation	
14.	Effective Bulk Meter Management	
15.	Effective Zone Meter Management and Assessment of Minimum Night Flows	
16.	Pressure Management and Maintenance of Pressure Reducing Valves	
17.	As-Built Drawings of Bulk and Reticulation Infrastructure	
18.	Schematic Layout of Water Infrastructure	
19.	Regulations and By-Laws	
20.	Tariffs	
21.	Technical Support to Customers	
22.	Removal of Unlawful Connections	
23.	Community Awareness and Education Programmes	
24.	Schools Awareness and Education Programmes	
25.	Newspaper & radio articles plus posters and leaflets for distribution	

Total:

