GUIDELINES FOR THE USE OF

MODEL PERFORMANCE BASED CONTRACT FOR WATER CONSERVATION AND DEMAND MANAGEMENT

Based on South African Procurement Law

Version 01/1410

prepared on behalf of GIZ and the Strategic Water Partners Network

These guidelines should be read in conjunction with the *Model Performance Based Water Conservation Water Demand Management Contract based on South African Procurement Law*, which has been produced on behalf of the Strategic Water Partnership and GIZ by David Still, David Schaub-Jones and Peter Ramsden.

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1. INTRODUCTION

South Africa is a water scarce country and many of our water resources are already fully exploited. This means that any further growth in water demand (beyond the 20 year planning horizon) will necessitate expensive measures such as long distance water transfer schemes from outside the borders of the catchment, or even the country, or from desalination plants at the coast. Meanwhile it is estimated that 37% of all bulk water supplied to our better-administered municipalities is wasted through either physical leakage or through the mismanagement of metering and billing systems. Our less well-administered municipalities do not know with any degree of certainty what percentage of their water supply is lost.

In this context what have come to be known as Water Conservation and Water Demand Management (WC-WDM or WCWDM) interventions have become critically important. It is generally far more cost effective to plug leaks and reduce the wastage of water than it is to build a new dam and transfer scheme from a neighbouring catchment. These WCWDM measures can range from social interventions such as community education regarding household water efficiency and losses, to the overhauling of billing systems, to the review of the tariffs charged for water, to active leak detection and repair, to better meter management and to better management of water pressures. Pressure management is in many cases the single intervention which makes the greatest difference in the shortest time, as water pressures in our distribution systems in South Africa have tended to be excessive, and it has been established that there is a more or less linear correlation between water pressure and water leakage.

WCWDM, in particular pressure management and leak detection is, nowadays, a fairly specialised field and most municipalities in South Africa do not possess the necessary technical skills to carry out this work in-house. The purpose of this generic contract document is to provide municipalities with a template for the employment of specialists to assist with this work.

Of particular interest is the use of performance based incentives to provide the specialist WCWDM contractor with a financial bonus linked to the value of the water which is saved through the WCWDM measures employed. Appropriately used, such incentives can ensure the most cost effective outcome. This is because the contractor is not just performing a service but is invested in the outcome of that service and will therefore be that much more creative, innovative and proactive to ensure that the best possible outcome is achieved.

The generic or model WCWDM contract provides a basic template which conforms to all current legislative requirements and best practice in terms of WCWDM optimisation. It also contains options for the employment of performance based incentives, and explains how they should be used.

Note: It is inadvisable to use a performance based WCWDM contract:

i) Where there is no provision for the accurate measurement of the total amount of bulk water supplied into the system
ii) Where there have not been reasonably accurate records kept of bulk water supply to the project area for a period of at least two years prior to the commencement of the contract
iii) Where the Employer’s knowledge of the water supply system with respect to the type, location and extent of pipes and valves is very uncertain
iv) Where the water supply system, or a significant portion thereof, is not functional at all.

Furthermore, the drafting and administration of WCWDM contracts is more specialised than the drafting of conventional water supply construction contracts, and the Employer must ensure that it uses a person or persons competent in this field in order to compile and manage such a contract. This may require having to procure the services of a specialist advisor for this purpose.

Should the circumstances not be suitable for the use of a performance based WCWDM contract the Employer should rather call for proposals from suitably experienced service providers to assist with a preparatory phase. In this case the service providers would typically be remunerated on a fee or time and cost basis using for example the ECSA Guideline for Services and Fees as a basis for the appointment. This phase, if successful, would result in more favourable circumstances for WCWDM activities to take place, which may or may not be performance based.

2. HOW DOES ONE GO ABOUT REDUCING WATER DEMAND?

At a basic level Water Conservation and Water Demand Management is simply a matter of common sense and routine work. Ideally, before any specialised work is attempted (indeed before the services of an external service provider are sought, let alone one employed using a performance based contract) the following matters should be addressed as far as is possible:

- Visible leaks should be repaired
- Existing control meters and valves should be located, checked and refurbished where necessary. You cannot do WCWDM on a system where the meters and valves do not work, or where they cannot be found.
- The main Bulk Management Meter, or Meters, which measure all water supplied to the area in question must be in place, working, and their accuracy must be verified. In the case of Custody Transfer Meters (used for sales of water from one entity to another) these should be duplicated, with the second meter used as a check on the first meter.
- The main pressure reducing valves (PRVs) must be located, checked and refurbished where necessary. The functioning of these PRVs will be fundamental to the integrity of the system and if they are not working or are out of adjustment this could result in major downstream losses and pipe bursts.
- There should be a working relationship between the financial and technical sections of the municipality, with a healthy sharing of information on meter readings and billing. The meter reading and billing data for the areas to be dealt with in the contract should be available for the contractor’s use.

The typical scope of work for a WCWDM contract would include some or all of the following tasks:

NOTE: Some of these tasks are inter-related and may take place in parallel.

Task 1: Community awareness and education

WCWDM work tends to be driven by engineers, who may not appreciate the importance of community education in achieving water savings. Such education is in fact critical to the success of many WCWDM projects. The end objectives are:

- the development of a general understanding, appreciation and support for WCWDM
- the development of greater respect for municipal infrastructure
- improved knowledge of how to detect water losses whether in the home or in the street
- a greater willingness to take active steps to reduce these losses.

The following work is typically required:

- engagement with community leaders (elected and/or traditional) to ensure that they are fully informed regarding the project and that they support the project
- community meetings and workshops
- community drama
- house to house visits
- use of advertising media such as radio, billboards and pamphlets to further cement the above initiatives
- establishment of a hotline for reporting leaks, if one does not exist

Any public messages must be appropriate in terms of language, design and content.

If this work is included in the Contract (and it is generally a key element in most WCWDM contracts), then appropriate allowances should be made in the reimbursable costs section of the BoQ for items such as advertising, pamphlets, community based functions, transport, uniforms or protective clothing for Water Conservation Officers, etc.

Task 2: Sectorisation

Sectorisation is closely related to flow and pressure logging (Task 3). Such measurements are of very limited or even no use if the boundaries of the supply zone are not clearly understood and managed. You cannot analyse or understand a flow record if you do not know how many connections are being supplied, or if the number of connections being supplied is subject to change due to the opening of valves which are supposed to remain closed, or vice versa. Likewise you cannot understand a pressure record if the pressure in the zone in question is subject to random changes due to the opening of boundary valves which are meant to remain closed.

Supply sectors should be determined on the basis of topography and geography (i.e. generally in terms of system function and layout) rather than the blanket application of rules of thumb such as number of connections per zone.

Pipes linking pressure zones can be cut and capped to prevent accidental linking of different sectors. However, municipalities generally prefer to have the option of cross-feeding across zones in emergency circumstances, so such “hard disconnects” are not popular with operators.

Task 3: Flow and Pressure Logging

Flow and pressure logging are fundamental to WCWDM. Analysis of flow and pressure records can be used to determine the extent of background and burst leakage, and to what extent these can be reduced using various WCWDM interventions such as pressure management and active leak detection. The work entailed is:

- Location of existing bulk meters and pressure reducing valves and refurbishment or replacement where they are inadequate or inaccurate
- Installation of new meters where required
- Installation of data loggers at key pressure and flow points
- Analysis and reporting on results of pressure and flow logging

Flow and pressure logging – particularly of key points - should be done on a real time basis, with alarms used to warn the operator when either pressures or flows register outside of their prescribed parameters. For example, an unusually large pressure drop may indicate a pipe burst, while an unexpectedly large pressure rise might indicate that a pressure zone has been compromised by the opening of a boundary valve. Likewise an unexpectedly large flow might indicate a downstream pipe burst, and an unexpectedly low flow might indicate an upstream pipe burst or other system problem such as a closed valve.

Task 4: Pressure Management

In the right context and with good design, Pressure Management can be the single most cost effective water savings measure for a given supply area. Through extensive international experience as well as South African experience it has been found that leakage is approximately directly proportional to pressure, i.e. a halving of pressure will halve leakage. The ability to deliver sufficient flows for fighting fires during times of peak water usage is the dominant design criteria for urban water systems, which means that most of the time these systems are significantly over-pressurised. In addition norms and standards are changing regarding what the acceptable normal pressures should be. Pressure management can be achieved in one of three ways:

- Fixed pressure reduction
- Time based pressure reduction
- Flow based pressure reduction

In the case of fixed pressure reduction the excess pressure is stepped down through a pressure reducing valve. Regardless of the upstream pressure, the pressure just after the valve will be at a set level. This is the most commonly used option to ensure that local pressure is within an acceptable range (say 3 to 5 bars). In cities with sloping or hilly terrain (e.g. Durban) such valves are common.

Time based pressure reduction is more sophisticated and hence more expensive. An electronic control system is coupled to a PRV and this is used to vary the output pressure according to the time of day. By studying the flow and pressure records for the area in question it may be seen that it will be feasible to step the pressure down by greater amounts at times of low usage (e.g. from late at night till early in the morning). In this way a greater loss reduction is achieved than would be the case for a fixed PRV.

Flow based PRVs are more sophisticated yet. The flow based controller varies the pressure in the system based on the system demand. As the demand increases, so the aperture is opened to allow more flow to meet that demand, and as the demand decreases, the aperture is closed. The controller works in real time or close to real time (depending on the technology used) and therefore emergencies such as fire fighting requirements can be catered for.

The design, construction and management of advanced pressure management facilities is highly specialised work which is suitable for performance based contracts. The more specialised the intervention, the more appropriate it would be to use a pure performance based contract where the contractor bears the full cost of the intervention and is remunerated on a share of the cost savings. This is so because in some cases a relatively simple and inexpensive intervention will achieve nearly the same results as a much more complex intervention, while in other cases it will not. If the contractor is paid the full installation cost regardless of performance then there will be no incentive to use the most cost-effective technology. As the more advanced technologies also require long term specialist support for operation and maintenance, they should not be used where the marginal savings they produce are less than the cost of their upkeep.

Task 5: Active leak detection

The first step in active leak detection is simply to patrol all pipelines in the network to check for visible signs of leakage either on the ground above the pipe, or in stormwater drains or streams near the pipes. A second step will be to check sewer flows. Where these are abnormally high, where the flow pattern does not correspond with expected sewer usage, or where the flow looks more like clean water than sewage, the possibility of a pipe leak should be investigated. The third step is the use of listening devices which aid the user to hear underground leakage above a certain threshold (usually 200 to 300 litres per hour). These devices range from very simple to rather sophisticated and the choice of equipment should rather be left to the WCWDM service provider and should not be paid for through the contract, otherwise the service provider may use the contract to purchase all kinds of equipment which will be of no use to the client when the work is completed.

The contract may or may not include tasks for the repair of leaks detected. If the contractor is paid for repairing leaks on a reimbursable basis, then the Employer’s Representative must verify all leaks before they are repaired.

Task 6: The inspection and replacement where necessary of non-domestic water meters

Institutional, Commercial and Industrial (ICI) customers often account for a large proportion of a municipality’s water supply. For example, Chis Hani Baragwanath Hospital is Johannesburg’s single largest consumer. Westville Prison is one of eThekwini’s largest consumers. The Ekurhuleni Metropolitan Municipality, with the greatest concentration of industry in South Africa, has 25 000 bulk consumers. These meters are important as industrial customers not only use much more water than domestic customers, but their willingness and ability to pay for their water is usually good. The WCWDM work entailed in this task is as follows:

- Check that all ICI consumers are metered (there are various ways of doing this – a useful first step is to plot all ICI meters on an aerial photo and to look for ICI properties for which no meter is plotted)
- Conduct pressure-drop tests to check if all connections to ICI properties are known and metered (if they are all known then if they are all isolated at the same time the pressure on the property will drop to zero)
- Consolidate connections to ICI properties where advisable (over time some properties may have acquired a large number of connections, not all of which might be necessary)
- Verify the accuracy of ICI meters and replace meters where advisable
- Audit meter reading (use spot checks, change meter readers)

The above actions will not necessarily reduce water supply, but they will reduce the amount of non-revenue water which the municipality is supplying and will therefore improve the municipality's financial health, which is critical to its ability to maintain its water systems in general.

As part of this activity bulk meters may be installed at all fire hydrants.

Task 7: The inspection and replacement where necessary of domestic water meters

The objective of this task is to have a functioning meter on every domestic property, and to have the correct details (account number, meter number, type, reading, GPS co-ordinates) for every meter accurately logged in the billing database.

Broken, leaking or missing domestic water meters can be the cause of a significant amount of water losses, whether physical, financial or both. A municipality may elect to replace all its domestic water meters in order to standardise them and upgrade to a more modern technology. However, even without going to such lengths, the minimum work that should be done is:

- Inspection of all domestic meters for leaks and functionality, and fixing or replacement where necessary
- Liaison with the municipal billing section to improve the billing database
- The production of meter variance reports that identify out of the normal changes in meter readings, consistently higher than expected readings, zero readings, etc.

Task 8: Leak reduction on domestic properties

One of the largest areas of water loss may be on private properties, mainly through leaking taps and toilets, but also through on site pipework which may be old and rusted or damaged. If the consumers were all paying for all their water consumption this would only be a problem to the water utility if the dams or groundwater resources providing the water were unable to meet the demand. However, firstly there is a long tradition of not paying for municipal services in South Africa's poorer communities and secondly South Africa is a semi-arid country whose existing water resources are already highly or even over-subscribed, so excessive leakage is a problem. The work entailed in the reduction of leaks and non-revenue water on domestic properties may involve all or some of the following:

- An extensive community engagement and education programme to develop an awareness of the need for water saving (see Task 1)
- Recruitment and training of community based plumbers
- House to house inspections to look for leaks (note: small leaks which may be significant over time may not be large enough to register on water meters)
- Fixing of on-site leaks

Note that some municipalities have decided that it is a bad idea to go onto private properties and fix leaking taps and toilets at municipal expense, as this gives property owners the impression that they no longer have to fix their own plumbing. However, if done systematically the costs of such interventions are low (typically about R120 per house, if the programme is well managed and cost effective) and are paid for in water savings within months. If this programme is coupled with appropriate information and education, they do not have to result in consumers concluding that they are no longer responsible for their water consumption above the free basic monthly allowance.

Some WCWDM practitioners believe that actions involving debt collection and actions involving leak reduction should not be combined in the same contract. The contractor working on leak reduction needs the community's cooperation and needs to be able to work for extended periods in the community without fear of interference. Debt collection is by nature more confrontational and should be carried out by a different service provider with the appropriate skills and experience.

Task 9: Pipe replacement

Pipe replacement has of late drawn attention as a high profile WCWDM intervention. It can however be argued that it is the least cost-effective intervention, particularly if carried out on a wholesale basis. Indications that pipe replacement may be necessary are unusually high burst frequencies (usually measured in burst per 1000 connections per year, where 3 is low and 30 is high) and high background leakage (measured using the internationally standardised Infrastructure Leakage Index or ILI, a multiple of losses considered unavoidable in terms of international norms, where 1 is on par with the expected minimum and 10 or more is therefore high). However, before concluding that the background leakage is high efforts must first be made to eliminate or reduce the burst leakage. One significant undetected burst running into a sewer or stormwater drain, for example, could skew the perceived background leakage figures for an entire supply zone.

Experienced WCWDM practitioners caution that wholesale pipe replacement can have the unexpected effect of increasing burst frequencies in adjoining areas where the pipes have not been replaced. This is because old leaky pipes are themselves a crude form of pressure abatement. When they are replaced, the pressure in the area goes up, and pipes that hitherto were not leaking then start to leak. This is not to say that old leaky pipes should not be replaced, but that it takes some time before a reduction in water demand is observed.

Task 10: Training of municipal officials and hand-over

The final task towards the end of a long term WCWDM contract should be training of the municipal officials who will be responsible for the infrastructure once the contract is over. This training should include at least the following:

- Operations and maintenance procedures for all specialist items (loggers, PRVs, controllers)

- Operation and Maintenance Manuals for specialist items
- As built drawings of new installations
- Contact details for specialist service providers
- Understanding of flow logs
- Understanding of pressure logs
- Recommended daily, weekly and monthly WCWDM procedures

Suggested prioritisation of tasks

Generally it is anticipated that the highest efficiency gains will be achieved by the following tasks:

- Visible leak detection and repair on the distribution network.
- The inspection and replacement where necessary of non-domestic water meters and the installation of meters on fire hydrants.
- The installation or refurbishment of pressure reducing valves on bulk mains.

It is recommended that at least these tasks should be included in the Performance Based WCWDM Contract.

Certain of the other tasks are required to manage the Performance Based Contract and should preferably be established during the Feasibility Phase by the Employer's Representative appointed to develop the baseline, specifically:

- The inspection and calibration of zone water meters.
- The data logging of flow at the zone supply meters and the pressure upstream and downstream of the pressure reducing valves.
- A quarterly non-revenue water balance in accordance with the IWA water balance calculation.

Further reading

For a full treatment of these topics readers should obtain a copy of the WRC report "Guidelines for Implementing Water Demand Management in South African Municipalities" (WRC Project K5-2130, the expected publication date is mid-2014 but from March 2014 a final draft copy may be obtained from WRP Engineers www.wrp.co.za).

Detailed Scope and Bill of Quantities

All of the above work can be reduced to professional time, skilled, semi-skilled and unskilled labour, materials and provisional sums. The Bill of Quantities appended to this Generic Contract gives an indication of how this might be done, but is merely an illustration. The actual bill must be a reflection of what is needed for the particular job in hand.

Where it is likely that the WCWDM service provider will be more knowledgeable about the specification for a particular item than the Employer's Representative, then the contract should rather make use of provisional sum allowances and the details and costs of these items should be determined once the successful tenderer has been identified based on the most competitive rates for the items which can be quantified at the design and planning phase. If a disproportionate value of the total contract is made of provisional sums then a fair and reasonable adjudication of tenders will be difficult. In such cases it may be better to use a pure performance based contract with no reimbursement for time and costs incurred i.e. the service provider's costs are fully covered by the share in the savings provided for by the performance bonus.

3. WHAT IS A PERFORMANCE BASED CONTRACT?

A performance based contract is one where the contractor is paid based on the outcome of certain contractually defined performance based indicators. To take an example from the sporting world, if a sponsor contracts a soccer player undertaking to pay a R10 000 bonus for every goal scored by that player in a specified format of the game (e.g. PSL games), then the amount to be paid is R10 000 times the number of goals scored during the period under review. The number of games in which the player takes part during the review period is immaterial in the calculation of the payment.

Payment can be purely performance based, or it can be a *mix* of performance based and other items. These other items can be "measurement" based, which is the standard basis for most civil engineering construction contracts (with payment being made according to the measured amount of work done against tendered rates for the different types of work entailed).

In reality then depending on how a contract is structured the payments could be anything from 100% Performance Based to 0% Performance Based. However, whether the performance bonus makes up 5% or 95% of the contract value, the same contract document can in principle be used. The *Model Performance Based Contract for use in South Africa* provides a template for Water Services Authorities on which they can base their WCWDM contracts. The template provides for a mix of performance bonus payments and reimbursable items based on a Bill of Quantities.

4. WHEN IS A PERFORMANCE BASED CONTRACT A PUBLIC PRIVATE PARTNERSHIP?

In South Africa a public entity may not enter into what is known as a Public Private Partnership (a PPP) without first gaining the approval of the National Treasury. A PPP is broadly defined. It includes a transaction where a private party performs a public function on behalf of a public entity (e.g. Eskom, or a municipality), assumes substantial financial, technical or operational risks and receives a benefit through a consideration paid by the entity or the charging of fees.

A WCWDM contract which has a small performance bonus component where the bonus is used primarily to provide an incentive, but where the service provider will not necessarily make a loss if the bonus is not paid, will not qualify as a PPP. Where however the service provider is financing all of or at least the major part of the work in the expectation that it will recover these costs through being paid a share of the resulting savings to the client, then this would qualify as a PPP. If in doubt whether the project is or is not a PPP the responsible officials at National Treasury should be consulted. Treasury has a section dedicated to PPPs and the officials there will be able to provide invaluable guidance and assistance if they are consulted at an early stage. They will not insist on classifying any and all performance based contracts as PPPs and are only concerned with those where there are substantial risks involved.

A comprehensive feasibility study is a pre-requisite of a PPP. The matters that must be covered in the feasibility study are set out in s 120(4) of the *Public Finance Management Act* and Regulation 3 of the PPP Regulations. The feasibility study must explain the strategic and operational benefits of the public-private partnership for the municipality in terms of its objectives as well as the effect on revenue flows of the municipality.

Appendix B deals with the legislation and regulations concerning PPPs in more detail.

5. HAS THIS BEEN DONE BEFORE?

Performance Based contracts, particularly in the field of WCWDM, are becoming more common although they are still relatively untried. Only two WCWDM PBCs have been used in South Africa to date, both for the Emfuleni Municipality. The first involved a large pressure management chamber installed in Sebokeng in 2005 entirely at the service provider's cost. It resulted in a saving of R150 million in bulk water costs over the subsequent five year period, The service provider was paid R25 million and incurred costs of R15 million. The service provider company therefore made R10 million (over five years) in return for raising and risking R15 million, and in return for its technical expertise. The client municipality saved R125 million.

International experience with PBCs is summarised in Appendix A.

6. BEFORE ENTERING INTO A PERFORMANCE BASED WCWDM CONTRACT

Preparatory work

Before an external service provider can be contracted to carry out a performance based WCWDM contract, the following information must be obtained:

- The boundaries of the Supply Zone that is to be the project area
- The position and meter numbers of the bulk meters that are to be used for calculating and measuring the water supplied into the area.

The following should also be available and, where possible, supplied to the prospective tenderers:

- The critical points for purposes of regulating the minimum water pressure shown on the pipe network layout.
- Layout of pipe network, including pipe location, extent, types and diameters
- Positions and types of all valves including isolation, pressure reducing, scour and air valves
- Positions and types of all control water meters, large and small
- Positions, sizes and types of all reservoirs and break pressure tanks
- Details of water tariffs

Obviously one cannot enter into a performance based contract without first deciding what indicators will be used on which to determine the change in performance. Such indicators must be quantifiable, measurable and auditable, and they must be linked to the execution of the contractor's WCWDM tasks. Examples of possible indicators which may attract bonuses may include, for example:

- Total water supplied into the project area
- Burst frequency per kilometre of pipelines
- Night flow
- Numbers of pressurised connections
- Numbers of water meters read
- Quantity of Non-Revenue Water
- Billed revenue
- Collected revenue

In each case the method for the establishment of the baseline must be set out, the assumptions and method for the projection must be detailed, and the method for the calculation of the bonus must be clearly specified.

To date the only two performance based contracts in South Africa have used only one indicator, the saving in the total water supplied into the area. This is the simplest indicator to determine, requiring only the subtraction of one number from another i.e. the actual water supply over the contract period vs what the expected water supply could have been expected to be had the WCWDM interventions not taken place. Apart from being relatively simple to determine, a further advantage of this indicator is that it is directly linked to a financial cost to the Employer which is generally easy to determine (e.g. by using the bulk water tariff paid by the municipality or its own production costs). This makes it relatively easy for those responsible for approving the contract (and the resulting payments) to see and understand the corresponding benefit which will accrue or which has accrued.

Assuming that this indicator is used, the following work must be done before the performance based contract can be entered into (or drafted or advertised):

- Determine the historic water supply over a period of at least two years, and the confidence level of this estimate.
- Determine the projected water supply over the contract period, what factors have been taken into account and what assumptions have been made, and the confidence level of this estimate.

The above figures should be provided in the contract in both graphic and tabular format.

The supply projection should be one that is considered most probable based on all known factors and on reasonable assumptions. In the absence of any specific information indicating that a more complex approach should be used, the "Baseline Volume" (see definitions below) should be extrapolated from the historic water supply data using a simple straight line least squares fit. More complicated exponential techniques are prone to error, difficult to audit and also difficult to explain to less technically inclined users.

7. STRUCTURE OF THE MODEL CONTRACT DOCUMENT

Although water boards supply bulk water to a number of South African municipalities, it is the municipalities themselves who are almost always responsible for what happens to that water, and hence for the consequences of any losses. It is therefore likely that the Employer for a WCWDM contract will in most cases be one or other municipality. The *Model Performance Based WCWDM Contract for use in South Africa* has therefore been drafted to comply with procurement practice and regulations in the South African municipal sector.

The structure of the contract follows the format standardized by the Construction Industry Development Board (CIDB) which is a national standard and which is familiar to municipal procurement officials and consulting engineers alike (note – while the person employed to draft the contract does not have to be a professional engineer, it is quite probable that such a person will in fact be involved in some way or other in the process). The various “returnable documents” included in the document may seem excessively bureaucratic in nature but they are mostly required in terms of municipal procurement regulations and none of them should be removed without checking with the responsible local officials as to whether they are regarded as important or not.

The model contract is structured as follows:

Part T1:	Tendering Procedure
	T1.1 Tender notice
	T1.2 Tender offer
	T1.3 Tender data
Part T2:	Returnable Documents
	T2.1 List of returnable documents
	T2.2 Returnable schedules
	T2.3 Other documents required for tender evaluation
	T2.4 Returnable schedules that will be incorporated into the contract
Part C1:	Agreements and contract data
Part C2:	Pricing data
Part C3:	Site Information
Part C4:	Scope of work
Part C5:	Generally applicable specifications
Part C6:	Particular project specifications
Appendix A:	Projection of water supply over the contract period
Appendix B:	Site information
Appendix C:	Calculation of Performance Bonus
Appendix D:	Bill of Quantities and calculation of tender price
Appendix E:	Pro-forma performance guarantee
Appendix F:	Standard Conditions of Tender
Appendix G:	Details of key personnel to be provided by the contractor

For the most part the items which need to be edited or filled in are highlighted in yellow. Guidance notes have been placed in the model contract at key points where relevant (these should be deleted before the tender is issued).

The main task which the drafter of the contract will have to carry out is the detailing of the following sections, which are project and site specific:

Part C3:	Site Information
Part C4:	Scope of work
Part C6:	Particular project specifications
Appendix A:	Projection of water supply over the contract period
Appendix B:	Site information
Appendix D:	Bill of Quantities

Conditions of Contract

In Part C1: Section 1.4.1 (Contract Data) of the *Model Contract* the following is stated: "*The General Conditions of Contract for Construction Work (GCC)*, Second Edition, 2010, published by the South African Institution of Civil Engineering, Private Bag X200, Halfway House, 1685 is applicable to this Contract and is obtainable from www.saice.org.za/book-store ."

If the contract drafter wishes to specify one of the alternative generally recognised forms of contract (e.g. NEC) then Part C1: Section 1.4 of the model contract must simply be edited accordingly.

GCC 2010 (as the above contract conditions are commonly referred to) is recommended because it is reasonably well known in the civil engineering industry, and is relatively straightforward in implementation. Although performance based WCWDM contracts are a specialised area of work they are nevertheless closer to civil engineering than anything else. Using GCC 2010 provides tried and tested procedures for contract management, particularly when it comes to variations and disputes, which is where contracts are particularly important.

8. PREQUALIFICATION

One of the key decisions that must be made when drafting the tender is what criteria will be used to determine the competence of any tenderer to do the specified work. In conventional construction contracts it is common to start by specifying that tenderers must have a certain CIDB grading in order to qualify to tender. Such a specification has not been included in the Model Contract. This is because the service providers in South Africa who are specialised in WCWDM are typically consultants and not contractors, and will therefore not necessarily have a CIDB grading. What is essential is that they do have demonstrable experience in WCWDM work, and a table is included in the Tender Data (Part T1: Section 1.3) which indicates how this experience might be assessed and graded. The required information for the assessment will be submitted by the tenderer with the following returnable documents:

D. Key Personnel.
E. Plant and Tools Schedule.
F. Schedule of Subcontractors.
G. Previous WCWDM Project Experience for Other Employers
H. Previous WCWDM work Undertaken for this Employer
I. Preliminary WCWDM Program

The contract drafter must decide what the minimum competence ("quality") criteria will be for a tender to be considered. Note that this is a pass/fail requirement and once a tender is considered as meeting quality considerations then quality (also referred to sometimes as "functionality") may no longer be used as a factor in determining the tender outcome. In other words if the minimum points requirement for quality is 60, and if a tenderer scoring 60 is in other respects (i.e. price and BEE rating) more competitive than another tenderer scoring 100 points for quality, then the tenderer scoring 60 points for quality must be awarded the contract. This is in accordance with South African procurement legislation as tested in a number of court cases.

9. B-BBEE LEGISLATION

Compliance with Broad-Based Black Empowerment Legislation is provided for by the application of the Conditions of Tender, in particular clauses F.3.11.7 and F.3.11.8 under the Tender Data (Part T1: Section T1.3) and clauses F.3.11.7 and F.3.11.8 under the Standard Conditions of Tender (Appendix F).

The requirements for achieving the respective B-BBEE gradings are subject to statutory regulations and tenderers must submit appropriately certified B-BBEE certificates with their tender documents. The 90/10 and 80/20 references relate to the weighting to be given to preference points. For contracts smaller than R500 000 in value a 20% weighting is given to preference points when adjudicating tenders. Above R500 000 a 10% weighting is used. It is highly unlikely that any WCWDM contracts will be less than R500 000 in value.

10. CONTRACT DATA

Part C1: Section 1.4.4 – "Data to be provided by the Employer" - is a key section of the tender document (and ultimately the contract document). Here the various standard items such as retention, contract duration, maintenance period etc are specified.

Regarding the contract duration, whereas a standard construction tender requires tenderers to give their own estimation of the time required to complete the work, a WCWDM contract will be for a fixed period which will be determined by the Employer. Time is needed for WCWDM interventions to have an effect hence it is inadvisable to use too short a period for such a contract. However, particularly if the performance bonus has a significant weighting in the contract, then it is inadvisable to use too long a contract period either, due to the reduction in the confidence of the Baseline Volume projections the further one projects into the future. Experienced practitioners advise that 36 months is a suitable compromise and this matches the National Treasury's MTEF Period meaning that a provable budget is available and the requirements of the MFMA are thus satisfied.

11. BILL OF QUANTITIES FOR REIMBURSABLE ITEMS

As far as possible items in the Bill should be reduced to measurable outcomes, e.g. km of pipe inspected, numbers of houses visited, numbers of PRVs located and checked, numbers of meters located and checked, number of loggers installed, months that loggers are managed and their data is analysed and reported on, and so on. However, particularly for WCWDM work it will be impossible to reduce all work to measurable outcomes, so a reasonable provision must be made for time, travel and materials costs. Time must be split into different skills (e.g. senior engineer, junior engineer, technician, community liaison officer, education officer, skilled artisan, semi-skilled artisan, general worker). Provisional sums should be included to allow for materials purchases that cannot be predicted until the work gets under way (e.g. bulk meter and PRV replacement). Where necessary a specification or a drawing might be needed to explain more fully what is meant by an item in the bill.

It is not necessary to include all WCWDM work in the Bill of Quantities, particularly where that work is of a specialised nature which will be hard to specify unless one is also an expert. Provisional sums can be used for some items, although a tender becomes less competitive if provisional sums comprise too great a percentage of the total of the billed items so these should be used only if absolutely necessary.

One option, which is appropriate for a performance based contract, is to exclude certain specified items from the Bill of Quantities and to specify that the costs of these specified items must be recovered through the performance bonus. This is effectively what is done when a contract is 100% performance based.

The Bill of Quantities in the Model Contract, Appendix D, Section D.2 provides a template for the quantification and the measurement of all these activities.

12. CALCULATION OF TENDER PRICE

A performance based contract presents an unusual situation when it comes to tender adjudication. This is because the contract value will ultimately be determined by a combination of measured and billed items (which are as stated in the Bill of Quantities) and the Payment of a Performance Bonus (which is based on a hoped-for saving which can only be guessed at).

In order to arrive at a Tender Price which will hopefully be not too far off the final contract value, the approach recommended in the Model Contract is as follows:

The Employer estimates and includes in the tender document the **Expected Efficiency Gain**, being the percentage saving in bulk water supply which is considered to be reasonably achievable through the course of the contract and which will be used for determining the offered total of the prices and for evaluating tender offers. The Expected Efficiency Gain is recorded in the Contract Data.

The Tenderer tenders the **Performance Bonus Rate**, the rate at which he must be paid for every kilolitre of water saved (subject to a threshold saving and a maximum saving, if these lower and upper limits are specified).[1]

With the above two numbers, i.e. the Expected Efficiency Gain and the Performance Bonus Rate, it is now possible to work out a Tender Price, in conjunction with the total carried forward from the Bill of Quantities for Reimbursable items.

Appendix D, Section D1 of the Contract Document provides a table for the calculation of the tender price.

<u>Assuming the following have been specified:</u>
A Baseline Volume projection for the full contract period of 63 165 870 kℓ.
An Expected Efficiency Gain of 10%

<u>And assuming that the contractor has tendered the following:</u>
A total of R5 000 000.00 for reimbursable items
A Performance Bonus Rate of R0.75/kℓ

Then the tender price is calculated as follows:

Worked Example 1: Calculation of Tender Price

A. The total carried from the Bill of Quantities for Reimbursable Costs (Section D.2) excluding VAT	*As tendered*	Rands	R5 000 000.00
B. The Baseline Volume projection for the period from the beginning of the seventh month of the contract to the end of the contract period (as per Appendix A).	*See Contract Data*	kℓ	63 165 870
C. The Expected Efficiency Gain	*See Contract Data*	%	10
D. The Expected Saving in Volume of Water	**B x C/100**	kℓ	6 316 587
E. The performance bonus rate - excluding VAT	*Tendered here*	R/kℓ	0.75
F. The expected performance bonus	**D x E**	Rands	4 737 440.25
G. The total tender price - excluding VAT	**A + F**	Rands	9 737 440.25
H. VAT on the total tender price	**G x 14/100**	Rands	1 363 241.64

[1] For further definitions of terms used refer to the contract document - Part C2: Pricing Data, Section 2.2: Performance Bonus

I. The total tender price - including VAT	**G + H**	Rands	11 100 681.89

Further examples of performance bonus and tender price calculations are included in Appendix C.

The Expected Efficiency Gain should be set at a level which will encourage appropriate price competition in the tendered reimbursable rates. If the Expected Efficiency Gain is set unrealistically high, then tenderers may price the reimbursable rates below cost, which may result in the contractor running into difficulties, which may jeopardize the completion of the contract. If the Expected Efficiency Gain is set unrealistically low, then the tenderers will not be likely to discount their reimbursable rates enough to justify the payment of an additional performance based bonus. The most appropriate level at which to set the Expected Efficiency Gain is one which is achievable with reasonable effort, given the requisite level of experience and competence.

13. SCHEDULE OF DEVIATIONS

Given the specialised nature of WCWDM work and the uncertainty inherent in estimating the contract value at the feasibility stage, it is quite probable that there will be a need to revise the contract scope or specifications between the tender stage and the appointment of the contractor. Such changes (prior to the signing of the contract) are termed “Deviations”. Section 1.2 under Part C1: Agreements and Contract Data provides for such deviations. Changes *after* the signing of the contract are dealt with as “Variations”, for which the procedures are laid down in the General Conditions of Contact (section 7 above refers).

14. OFFER AND ACCEPTANCE

The forms of Offer and Acceptance included at the beginning of Part C1 of the Model Contract indicate the acceptance by the two parties to the contract, the Employer and the Contractor, of the contract conditions and specifications. The price to be filled in on the form of Offer will be the Tender Price, adjusted according to the effect of any changes which may be agreed by the contract parties between the Tender Adjudication stage and the Contract Award stage, and which are specified in the Schedule of Deviations.

15. MONITORING AND EVALUATION

Without sound monitoring and evaluation of performance based water conservation and water demand management (WCWDM) contracts, it will not be possible to objectively determine the real success of this innovative concept.

The key reason to carry out monitoring and evaluation is to learn from the projects successes and failures, with a view to applying these lessons in future projects.

The party which should be most interested in the outcome of the monitoring and evaluation is the one who has put up the bulk of the finance to carry out the project. The project funder or financier should want to know:

- Were the project objectives achieved?
- Did the project make financial sense? (i.e. did the financial savings exceed the full project costs?)
- Were there any positive or negative spinoffs from the project, whether foreseen or unforeseen? (e.g. skills transfer, job creation, improved service reliability)

15.1. WHO SHOULD CARRY OUT THE MONITORING AND EVALUATION?

It is recommended that a third party, who is not a signatory to the contract, is separately appointed by the Employer to administer the performance based WCWDM contract. This party, termed the "Employer's Representative", will be responsible for ensuring that both parties to the contract observe their contractual obligations. The Employer's Representative must be an individual who is sufficiently knowledgeable about WCWDM work and is able to provide the necessary level of supervision and management.

While the Employer's Representative will manage and monitor progress of the contract on a month to month basis, and will in many cases also have drafted the contract and carried out the original feasibility study, this person (or organisation) is not the one who should carry out the evaluation. The Employer's Representative is too closely involved in the project from conception to conclusion and therefore could not easily provide an objective and completely frank assessment of its successes and failures.

The Employer, or the project funder if it is externally financed, should appoint another party who has no history with the project to carry out the evaluation. This party need not necessarily be an engineering professional. An accountant, for example, would have the necessary skills, as financial savings are at the heart of the rationale for the performance based approach.

15.2. WHEN IS MONITORING AND EVALUATION REQUIRED?

Monitoring is carried out routinely by the Employer's Representative. On large projects a team of several professionals may be employed full time to check all work in order to confirm that is has been done according to the designs and specifications, and to confirm that the contractor's monthly claims for payment are based on agreed measurements. However WCWDM (though it may entail a portion of new works) is by definition more about operational management than it is about new works, and therefore it is highly unlikely that the Employer will be able to afford a large and expensive team just to monitor the work being carried out by the contractor. What is more likely is that the Employer will employ a professional to spend a certain number of hours every month working with the contractor to ensure that the Employer's interests are looked after. The amount of time spent monitoring each month will depend on the value and the complexity of the contract.

Evaluation requires time and perspective and can therefore not be performed either too often or too soon. As a general rule, evaluation should be performed only after the conclusion of the contract when all the data has been finalised. For larger contracts it may also be useful to carry out evaluation soon after the midpoint has been reached.

15.3. WHAT SHOULD BE MONITORED AND EVALUATED?

For a Performance Based Contract to be successfully monitored and evaluated, it is essential that any indicator used in order to determine a performance bonus must be

- Quantifiable
- Measurable, and
- Auditable

Provided the indicator meets these criteria, provided that the method to be used for the determination of the bonus is simple and clearly specified in the contract, and provided that a sufficiently long history of accurate baseline data exists for the indicator in question, performance evaluation should not be either complicated or controversial.

In the case of Performance Bonuses the Employer's Representative will verify any claims made regarding the saving of water. Such claims will be based on comparison with the Baseline Volume which will be tabulated in the contract.

The scope of the routine monitoring of the contract is based on the contract document. Each month the contractor must be paid, and at agreed intervals in the course of the contract performance bonuses must also be determined (see the accompanying document *Guidelines for the use of the Model Performance Based Contract for Water Conservation and Demand Management based on South African Procurement Law* for worked examples showing how this might be determined). On a monthly basis a payment certificate will be submitted by the Employer's Representative to the Employer for payment to the contractor. This payment certificate will be set out according to the Bill of Quantities in the contract document, with columns added to show what has been previously certified for payment and what is new in the month under review. An example of an extract from a monthly payment certificate is shown in Appendix A.

Evaluation requires a wider scope than routine monitoring. It is not concerned only with the success of the performance based contract itself, but with the entire project cycle, from conception. The following are a number of questions which might be included in the scope of evaluation:

- What were the project's objectives?
- What indicators were used to measure success for each of these indicators?
- How were those indicators verified?
- What were the results?
- What were the lessons learned from the project, both positive and negative?

At the very least the project evaluation should consider the following:

i) What was the total cost of the project? The total cost would be inclusive of:

  - Feasibility and planning work
  - Finance costs (interest)
  - Reimburasable expenses
  - Performance bonuses
  - Professional fees

ii) What water savings and financial savings were achieved?
iii) Have the savings exceeded the costs? If not, if the savings can be sustained how long will it take after the end of the project for the savings to exceed the costs?

In addition the evaluation should consider the appropriateness of the following governing parameters which were specified in the contract:

i) The **upper and lower limits given for the tendered Performance Bonus Rate** which would have been the rate tendered by the Contractor per kilolitre of water saved due to the Water Saving, and which would have been the rate used in calculating the Performance Bonus.
ii) The **Performance Bonus Period** being the period for which the performance bonus calculation were made.
iii) The **Performance Bonus Cap** being the *maximum* efficiency gain measured in percentage terms which would have been permitted in the calculation of the Performance Bonus.
iv) The **Performance Bonus Minimum Threshold** being the *minimum* efficiency gain measured in percentage terms below which no Performance Bonus would have been payable.

A template to guide the project evaluation is included in Appendix B.

15.4. HOW SHOULD MONITORING AND EVALUATION BE CARRIED OUT?

Depending on the nature of the contract and the specifics of the project, monitoring and evaluation can range considerably in complexity.

The very simplest scenario would be one where all water supplied to the project area is measured by one bulk meter, and where the contractor's payment is exclusively based on water saved, with no reimbursables. In such a scenario all that must be done to calculate the payments due to the contractor is to subtract the amount of water actually supplied to the project area during the period in question, from the amount of water expected to have been supplied as stated in the contract data for that period (the "Baseline Volume").

A more complex scenario would be one where the project area is supplied with water from several different directions, where the contractor is paid not just on water savings but also for work done, and where the project objectives encompass more than just water saving e.g. employment creation, reduction of burst frequencies and so on. In such a scenario the party carrying out monitoring and evaluation must be able to verify the data by making independent checks and observations.

15.5. THE IMPORTANCE OF MONITORING AND EVALUATION

Sound monitoring and evaluation will be essential in order to ensure that any performance based water conservation water demand management project is successfully completed, and moreover that lessons are learned which can be applied in future projects.

Monitoring is concerned primarily with the management of the contract itself and takes places concurrently with the project. Whether the monitoring requires a professional team working full time or a just one individual working part time will depend on the scale of the project and what is deemed necessary.

Evaluation is concerned not just with the success of the contract, but with the whole project cycle, its costs and its objectives. The evaluation must investigate not only whether the contractor successfully did what he was asked to do, but whether he was asked to do the right things.

Appendix A

Calculation of Tender Price and Performance Bonus – worked examples

A1. Calculation and Comparison of Tender Prices

Consider a case where the cost of bulk water to a municipality is R5.00/kℓ, and where the upper and lower limits for the Performance Bonus Rate have been set at 30% and 15%, i.e. R1.50/kℓ and R0.75/kℓ.

Assume that the Baseline Volume projection given in the contract data is 63 165 870 kℓ, and that the Expected Efficiency Gain is given as 10%.

Assume that a certain amount of work is to be paid as Reimbursable Items, and that the Employer's estimate of the value of these works is R7.5 million. Assume further that the Employer bases his estimated cost of the contract on a Performance Bonus Rate set midway between the upper and lower limits, i.e. at 22.5% or R1.13/kℓ. The Employer therefore estimates that the cost of the WCWDM intervention will amount to R14 637 743 excluding VAT.

Note that in motivating the cost of the WCWDM intervention it can be shown that even though the work is expected to cost R14.6 million excl. VAT, as a result of the work the municipality can expect to save 10% in its water usage, or 6 316 587 kℓ, which at a cost of R5.00/kℓ will result in a savings in the bulk water account of R31.6 million, or a *net* saving of R16.9 million.

Consider a scenario where Tenderer A prices the reimbursable items conservatively (above the Employer's estimate) at R10 million and tenders the lowest admissible Performance Bonus Rate, i.e. R0.75/kℓ. His tender price comes to R14 737 440 excl. VAT, i.e. R100 000 above the Employer's estimate. Tenderer B prices the reimbursable items keenly (i.e. below the Employer's estimate) at R5 million and tenders the highest admissible Performance Bonus Rate, i.e. R1.50/kℓ. His tender price comes to R14 474 881 excl. VAT, i.e. R163 000 below the Employer's estimate.

Assuming both tenders are fully responsive and that both tenderers have acceptable track records in WCWDM work, the tender should be awarded to the lowest bidder, which in this case is tenderer B.

Tender Adjudication

			Employer's Estimate	Tender A	Tender B
A	Total from BoQ	R	7 500 000	10 000 000	5 000 000
B	Baseline Volume projection: month 7 to end	kℓ	63 165 870	63 165 870	63 165 870
C	Expected Efficiency Gain	%	10.0%	10.0%	10.0%
D	Expected saving in water	kℓ	6 316 587	6 316 587	6 316 587
E	Performance Bonus Rate	R/kℓ	1.13	0.75	1.50
F	Expected Performance Bonus	R	7 137 743	4 737 440	9 474 881
G	**Total Tender Price (excl. VAT)**	**R**	**14 637 743**	**14 737 440**	**14 474 881**
H	VAT	R	2 049 284	2 063 242	2 026 483
I	Total Cost of WCWDM incl VAT	R	16 687 027	16 800 682	16 501 364
	Savings in Bulk Water cost	**R**	**31 582 935**	**31 582 935**	**31 582 935**
	Net Financial Saving to Municipality (excl. VAT)	**R**	**16 945 192**	**16 845 495**	**17 108 055**

A2. Scenario Analysis – sensitivity to performance

The Employer should carry out a sensitivity analysis to check what is likely to happen if the Efficiency Gain is either above or below the expected 10% level.

Scenario 1 (see the table below) is that the water saving exceeds 10%. For example, assume that a 15% saving is achieved. In this case the actual cost of Contractor B will come to R19 212 321 excl. VAT, which is R4.7 million more than the awarded contract sum of R14.5 million (see Section C1 above). However the 15% savings in bulk usage now results in savings in the bulk water account of R47.3 million, or a *net* saving of R28.2 million, some R11.2 million more than the Employer's estimate of net savings.

If Tenderer A's pricing had been accepted and the same 15% savings had been achieved, the actual cost would have come to R17 106 160 excl. VAT, which is R2.1 million less than the projected actual cost for Tenderer B at 15% efficiency gain. The *net* saving now comes to R30.3 million, some R13.3 million more than the Employer's estimate of net savings.

Scenario 1: Performance Exceeds Expectations

			Employer's Estimate	Actual Cost A	Actual Cost B
A	Total from BoQ	R	7 500 000	10 000 000	5 000 000
B	Baseline Volume projection: month 7 to end	kℓ	63 165 870	63 165 870	63 165 870
C	Expected Efficiency Gain	%	10.0%	15%	15%
D	Expected saving in water	kℓ	6 316 587	9 474 881	9 474 881
E	Performance Bonus Rate	R/kℓ	1.13	0.75	1.50
F	Expected Performance Bonus	R	7 137 743	7 106 160	14 212 321
G	**Total Contact Cost (excl. VAT)**	**R**	**14 637 743**	**17 106 160**	**19 212 321**
H	VAT	R	2 049 284	2 394 862	2 689 725
I	Total Cost of WCWDM incl VAT	R	16 687 027	19 501 023	21 902 046
	Savings in Bulk Water cost	**R**	**31 582 935**	**47 374 403**	**47 374 403**
	Net Financial Saving to Municipality (excl. VAT)	**R**	**16 945 192**	**30 268 242**	**28 162 082**

Has the Employer then "lost" R2.1 million by not appointing Tenderer A who offered the lower performance bonus rate? In fact the municipality has not lost anything, but has only saved R2.1 million less. Before considering the relative merits of A and B's pricing strategy, consider the Scenario where performance is *below* expectations.

Scenario 2 (see the table below) is that the Efficiency Gain is below 10%. For example, assume that a 5% water saving is achieved. In this case the actual cost of Contractor B will come to R9 737 440 excl. VAT, which is R4.7 million less than the awarded contract sum of R14.5 million (see Section C1 above). The 5% savings in bulk usage results in savings in the bulk water account of R15.8 million, or a *net* saving of R6.1 million, some R10.9 million less than the Employer's estimate of net savings.

If Tenderer A's pricing had been accepted and the same 5% savings had been achieved, the actual cost would have come to R12 368 720 excl. VAT, which is R2.6 million more than the projected actual cost for Tenderer B (at 5% savings). The *net* saving now comes to R3.4 million, some R13.5 million less than the Employer's estimate of net savings.

Scenario 2: Performance is Below Expectations

			Employer's Estimate	Actual Cost A	Actual Cost B
A	Total from BoQ	R	7 500 000	10 000 000	5 000 000
B	Baseline Volume projection: month 7 to end	kℓ	63 165 870	63 165 870	63 165 870
C	Expected Efficiency Gain	%	10.0%	5%	5%
D	Expected saving in water	kℓ	6 316 587	3 158 294	3 158 294
E	Performance Bonus Rate	R/kℓ	1.13	0.75	1.50
F	Expected Performance Bonus	R	7 137 743	2 368 720	4 737 440
G	**Total Contact Cost (excl. VAT)**	**R**	**14 637 743**	**12 368 720**	**9 737 440**
H	VAT	R	2 049 284	1 731 621	1 363 242
I	Total Cost of WCWDM incl VAT	R	16 687 027	14 100 341	11 100 682
	Savings in Bulk Water cost	**R**	**31 582 935**	**15 791 468**	**15 791 468**
	Net Financial Saving to Municipality (excl. VAT)	**R**	**16 945 192**	**3 422 747**	**6 054 027**

In Scenario 2 the Employer has gained R2.6 million by not appointing Tenderer A who tendered higher rates for the reimbursable items.

Reflection on the scenarios above indicates that it is more to the advantage of the Employer to encourage bidders to price their reimbursable costs keenly and to aim to make their profits through good performance, rather than to price their reimbursables conservatively to ensure that they cannot lose money no matter what happens. With this tender strategy, performance below expectation results in lower than expected costs to the Employer even if the expected savings are down, whereas performance above expectations might result in higher costs, but these can be easily afforded from the much greater than expected savings. In the two scenarios the lowest net saving of R3.4 million comes from Tenderer (or rather Contractor) A with his conservative price strategy underperforming. In contrast the expected net saving if Contractor B with his performance-geared pricing strategy achieves 15% water savings is R28.1 million. It is true that an even higher net cost saving is achieved with Contractor A achieving a 15% efficiency gain, but given the relative pricing and incentives, the probability of Contractor B exceeding expectations is that much greater.

So, how can an Employer encourage tenderers to not overprice the reimbursable items and to gear their pricing towards performance? By setting the Expected Efficiency Gain at a level which is reasonably achievable. If the tendering company believes that it has a strong chance of exceeding the Expected Efficiency Gain (which is used in the tender pricing) then it will be that much more inclined to price the reimbursables keenly and to stake more on the prospect of doing well on the performance bonus.

A3. Calculation of Performance Bonus

The worked example below shows how the performance bonus would be calculated during the course of an actual contract.

The table below shows the baseline water projection and the actual water usage over a 36 month contract period. After 36 months the actual usage is 66 798 119 kℓ against a projection of 75 241 121 kℓ, an overall saving of 13.37%.

Month	Baseline Usage	Actual Usage	Saving	Baseline per 6 mnths	Use per 6 mnths
1	2 000 000	2 000 000	0.0%		
2	2 005 000	2 005 000	0.0%		
3	2 010 013	2 010 013	0.0%		
4	2 015 038	2 015 038	0.0%		
5	2 020 075	2 020 075	0.0%		
6	2 025 125	2 025 125	0.0%		
7	2 030 188	2 009 886	1.0%	Start of Performance Bonus	
8	2 035 264	1 994 558	2.0%		
9	2 040 352	1 979 141	3.0%		
10	2 045 453	1 963 635	4.0%		
11	2 050 566	1 948 038	5.0%		
12	2 055 693	1 932 351	6.0%	12 257 515	11 827 609
13	2 060 832	1 916 574	7.0%		
14	2 065 984	1 900 705	8.0%		
15	2 071 149	1 884 746	9.0%		
16	2 076 327	1 868 694	10.0%		
17	2 081 518	1 852 551	11.0%		
18	2 086 721	1 836 315	12.0%	12 442 531	11 259 584
19	2 091 938	1 819 986	13.0%		
20	2 097 168	1 803 565	14.0%		
21	2 102 411	1 797 561	14.5%		
22	2 107 667	1 791 517	15.0%		
23	2 112 936	1 785 431	15.5%		
24	2 118 219	1 779 304	16.0%	12 630 339	10 777 364
25	2 123 514	1 773 134	16.5%		
26	2 128 823	1 766 923	17.0%		
27	2 134 145	1 760 670	17.5%		
28	2 139 480	1 754 374	18.0%		
29	2 144 829	1 748 036	18.5%		
30	2 150 191	1 741 655	19.0%	12 820 982	10 544 791
31	2 155 567	1 735 231	19.5%		
32	2 160 955	1 728 764	20.0%		
33	2 166 358	1 722 254	20.5%		
34	2 171 774	1 715 701	21.0%		
35	2 177 203	1 709 104	21.5%		
36	2 182 646	1 702 464	22.0%	13 014 503	10 313 520
Total	75 241 121	66 798 119		63 165 870	54 722 868
			Saving		**13.37%**

The figure below shows the baseline water projection against the actual water usage.

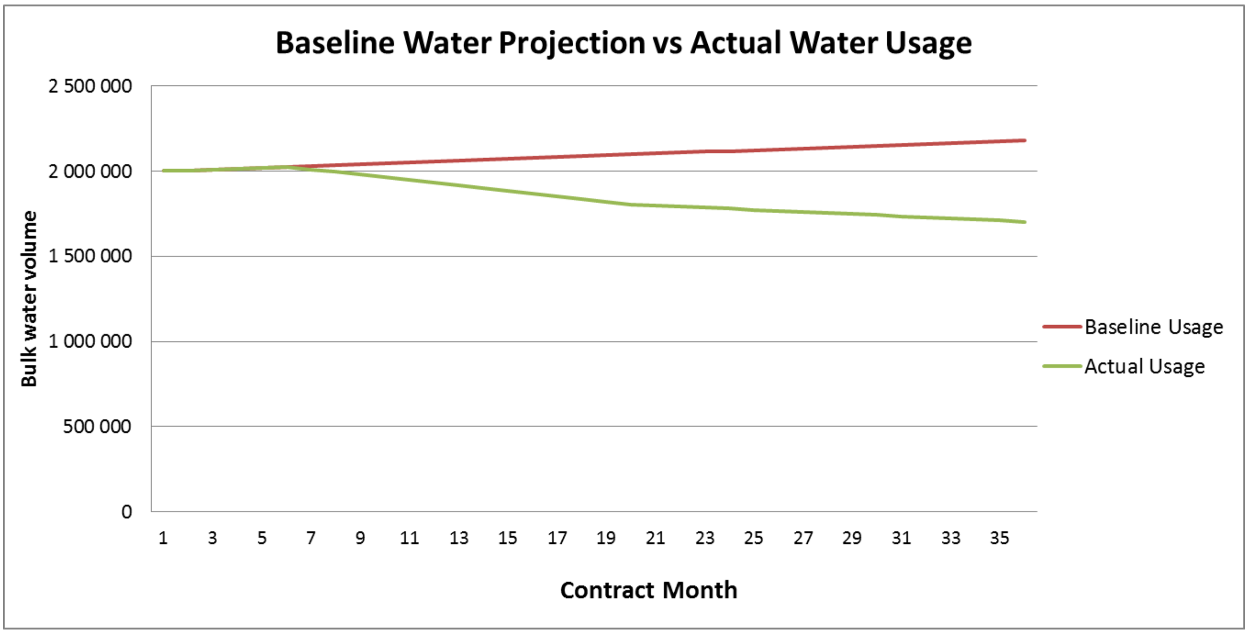


Table 2 below (from Appendix D in the Model Contract) shows how the performance bonus should be calculated.

Table 2: Method for Calculation of Performance Bonus.

A. The Baseline Volume projection for the Performance Bonus Period	kℓ	*from Appendix A*
B. The Performance Bonus Rate as tendered by the contractor	Rands/kℓ	*from Appendix D*
C. The Performance Minimum Threshold expressed as a percentage of the Baseline Volume	Percentage	*from Contract Data*
D. The Performance Bonus Cap for the Performance Bonus Period expressed as a percentage of the Baseline Volume	Percentage	*from Contract Data*
E. The actual volume of water supply for the Performance Bonus Period	kℓ	*as measured*
F. Water Saving due to WCWDM interventions	kℓ	**A - E**
G. Calculated Performance Bonus for the bonus period	Rands	**B x F**
H. Payable Performance Bonus for the period	Rands	**If savings is greater than C, then** **Either G, or** **A X B X D, whichever is the lesser**

Table 3 below shows how the actual performance bonuses work out for the savings shown in Table 1.

Note that there is no calculation for the first 6 months of the contract. This is the period during which the contractor is putting in place all the measures which should result in water savings and in terms of the contract no performance bonus is paid for this "settling in" period.

During the second six month period the saving achieved is only 3.5%. Although the volume of water saved (relative to the baseline) at the tendered performance bonus rate of R0.75/ kℓ would come to R322 429, the contract data in this case have specified that the threshold for the bonus payment is a 5% saving. This means that no bonus is payable unless the saving exceeds 5%. For the second six month period of the contract the bonus paid is therefore zero. For periods 3, 4 and 5 the bonus paid is equal to the deemed saving (water usage less baseline projection) times the performance bonus rate. In period 6 the deemed saving is 20.8%, which exceeds the Performance Bonus Cap of 20% which has been specified in the contract data. For this period then the bonus paid is equal to the maximum payable amount of R1 952 175 rather than the calculated amount of R2 025 737.

Table 4 provides a summary of the calculated and paid bonus payments for the 36 month duration of the contract.

Table 3: Calculations for Performance Bonuses using Data from Table 1

				6 monthly periods of contract					
				2	3	4	5	6	Totals
A	Baseline Volume projection	kℓ		12 257 515	12 442 531	12 630 339	12 820 982	13 014 503	**63 165 870**
B	The Performance Bonus Rate as tendered	R/kℓ	0.75	0.75	0.75	0.75	0.75	0.75	
C	The Performance minimum threshold	%	5%	612 876	622 127	631 517	641 049	650 725	**3 158 294**
D	The Performance Bonus cap	%	20%	2 451 503	2 488 506	2 526 068	2 564 196	2 602 901	**12 633 174**
E	The actual volume of water supplied	kℓ		11 827 609	11 259 584	10 777 364	10 544 791	10 313 520	**54 722 868**
F	Water savings due to WCWDM interventions	kℓ		429 906	1 182 947	1 852 975	2 276 191	2 700 983	**8 443 002**
G	Calculated Performance Bonus	R		322 429	887 210	1 389 731	1 707 143	2 025 737	**6 332 251**
H	**Payable Performance Bonus**	**R**		**0**	**887 210**	**1 389 731**	**1 707 143**	**1 952 175**	**5 936 260**
	Saving	%		3.5%	9.5%	14.7%	17.8%	20.8%	13.4%
	Minimum Performance Bonus	R		459 657	466 595	473 638	480 787	488 044	
	Maximum Performance Bonus	R		1 838 627	1 866 380	1 894 551	1 923 147	1 952 175	

Table 4: Summary of Bonus Payments

6 Month Period	Calculated Bonus (Rands)	Actual Bonus (Rands)	Note
1	0	0	No bonus payable – settling in period
2	322 429	0	Saving below threshold of 5% so no bonus payable
3	887 210	887 210	
4	1 389 731	1 389 731	
5	1 707 143	1 707 143	
6	2 025 737	1 952 175	Bonus capped at 20% saving

Appendix B

Extract from a typical monthly payment certificate

GENERIC PBC for WCWDM: EXTRACT FROM A TYPICAL MONTHLY PAYMENT CERTIFICATE

This is the standard format used for the valuation of monthly payment certificates in construction contracts according to GCC.

Using this format the total value of all work completed to date is calculated. On the summary page the total value previously certified for payment is deducted from this total, which gives the current amount payable.

ITEM NO	PAYMENT REF.	DESCRIPTION	UNIT	BILLED QUANTITY	QUANTITY PREVIOUSLY CERTIFIED AS COMPLETE	QUANTITY COMPLETED IN THIS PERIOD	TOTAL QUANTITY TO DATE	RATE	VALUE OF WORK COMPLETED TO DATE
D		**ACTIVE LEAK DETECTION**							
D1		**Leak Detection**							
D1.1		Inspect existing pipelines and note any visible surface leaks.	m	50 000.	20 000.	5 000	25 000.	R 0.20	R 5 000.00
D1.2		Extra-over above for inspection of all visible chambers	No.	500.	200.	100	300.	R 50.00	R 15 000.00
D1.3		Extra-over above for the location and inspection of buried / hidden chambers	No.	50.	20.	10	30.	R 500.00	R 15 000.00
D1.4		Extra over above for inspection of consumer meters (regardless of size)	No.	500.	300.	100	400.	R 20.00	R 8 000.00
D1.5	**SPEC**	Hire / supply of specialist equipment for active leak detection (as stipulated)	Sum	1.	0.5	0	0.7	R 20 000.00	R 14 000.00
D1.6		Use of above equipment	Days	20.	10.	2	12.	R 1 000.00	R 12 000.00
D2		**Leak Repair**							
D2.1		Excavation to expose existing services at leaks							
D2.2		Excavation in all materials to expose existing services at leaks, backfill, compact and dispose of surplus material	m³	100.	50.	10	60.	R 100.00	R 6 000.00
D2.3		Extra over Item D2.1 above for excavation of Asphalt surfaced roads	m³	20.	10.	2	12.	R 200.00	R 2 400.00
D2.4		Extra over Item D2.1 above for excavation of concrete surface	m³	20.	10.	0	10.	R 300.00	R 3 000.00
D2.5		Reinstatement of Surface road	m³	20.	0.	0		R 500.00	
D2.6		Reinstatement of concrete surface 25 Mpa	m³	20.	0.	0		R 600.00	
D2.7		Repair of / replacement of existing infrastructure required for works	sum	1.	0.1	0	0.3	R 50 000.00	R 15 000.00
D2.8	SPEC	Isolate section of network	no.	5.	5.	2	7.	R 500.00	R 3 500.00
D2.9		Scour section of network	no.	10.	5.	3	8.	R 500.00	R 4 000.00
D2.10		Senior Engineer	hrs	50.	10.	5	15.	R 900.00	R 13 500.00
D2.11		Junior Engineer	hrs	50.	10.	5	15.	R 600.00	R 9 000.00
D2.12		Senior Technician	hrs	50.	10.	5	15.	R 400.00	R 6 000.00
D2.13		Junior Technician	hrs	150.	50.	5	55.	R 200.00	R 11 000.00
D2.14		Plumber	hrs	300.	100.	50	150.	R 120.00	R 18 000.00
D2.15		General Assistants	person days	60.	20.	10	30.	R 150.00	R 4 500.00
D2.16		Supply and delivery of materials for repair of leaks to site	pc sum	1.	0.2	0	0.3	R 30 000.00	R 9 000.00
		Total carried forward to page D1							R 173 900.00

For a discussion and examples of the method used to calculate the performance bonus, refer to Appendix A, Section A3 above.

Appendix C

Template for the Evaluation of a Performance Based WCWDM Project

PROJECT TITLE			
Water Services Authority	**Water Services Provider**		**Project Location**
Project Description			
FINANCIAL ASSESSMENT			
Project Costs			
		Planning and feasibility work	A
		Monitoring costs	B
		Measured work	C
		Performance Bonuses	D
		Evaluation	E
		Finance (interest and transaction costs)	F
		Other	G
		TOTAL COSTS (VAT excl.)	H = Sum(A to G)
Financial Savings Resulting from Project (VAT excl.) (total water saved relative to Baseline Projection over the assessment period, times the cost of that water applicable at the times it was saved)			I
	NET PROJECT SAVING (COST) i.e. Total Savings less Total Costs		J = I - H
Period during which savings were achieved (months)	K	Rate of Savings per month	L = I/K
Months required to cover project costs at rate of savings achieved			M = H/L
Assessment of Performance Bonus Parameters			
Parameter	**Value Used**		**Assessment**
Performance Bonus Rate Limits			
Performance Bonus Threshold			
Performance Bonus Cap			

ASSESSMENT OF SECONDARY PROJECT OBJECTIVES (all material filled in purely for illustrative purposes)			
Objective Name	e.g. Employment creation	**Objective Number**	2
Objective Description	To create employment through the project		
Key Performance Indicator	Number of Full Time Equivalent (FTE) jobs created of 3 months duration Calculated as Number of Person Months of Employment created / 3		
Project KPI Target		1600 FTEs	
Project KPI Achievement		1400 FTEs	
Notes regarding this objective Only jobs created in the local community are to be measured under this objective. It does not include the person-months spent by the professional teams from outside the project area.			
Evaluation (reflect on the usefulness of this objective, and on the usefulness of the indicator used to measure success, as well as on the measure of success achieved) The creation of employment in the project area helped to increase the community involvement in the project and helped to achieve all round co-operation. The objective is therefore considered important and useful. The FTE indicator (based on 3 months employment) is somewhat random but is standard practice in the Expanded Public Works Programme and is therefore used for the sake of consistency. The project achieved 87.5% of the target KPI. Due to political interference unrelated to the project during the early stages some time was lost before the employment of local staff was running smoothly.			

OVERALL EVALUATION
Was the project successful financially?
Did the project meet its secondary objectives?
SUMMARY (in answering the questions below, reflect on the experience of all parties to the contract)
What went well with project?
What did not go so well?
What particular challenges were encountered in the implementation of this project?
What lessons have been learned for future contracts of this nature?

MODEL PERFORMANCE BASED CONTRACT FOR WATER CONSERVATION AND DEMAND MANAGEMENT

BACKGROUND DOCUMENTATION

Selected Lessons from International Experience

Public Private Partnerships

Case Study: Emfuleni Water Conservation and Demand Management Project

Strategic Water Partners Network
SOUTH AFRICA

Performance Based Contracts for Reducing Non-Revenue Water:

Selected Lessons from International Experience

David Schaub-Jones
December 2013

Table of Contents

Acronyms & Abbreviations

ADB	Asian Development Bank
IFC	International Finance Corporation
IWA	International Water Association
NRW	Non-Revenue Water
PBC	Performance-Based Contract
PPP	Public-Private Partnership
WC	Water Conservation
WDM	Water Demand Management

Introduction

South Africa, as a semi-arid country, is required to invest heavily in primary and secondary water resources infrastructure to ensure that adequate water is available to satisfy its domestic, commercial and agricultural demand. It is estimated that, of this total demand, the municipal water services sector represents 27%.

"After years of poor maintenance, especially in (South African) municipalities, a crisis is looming as more people run out of water. It will cost more than R600 billion rand to rectify"

Mail and Guardian, page 17, 20th December 2013)

As the Minister for Water and the Environment made clear in 2013 when launching a study into 'non-revenue water', the sector continues to experience high water losses and leaks attributed to, amongst others, aging water infrastructure, inconsistent metering and billing systems, lack of awareness amongst customers and poor operation and maintenance of water supply systems. She went on to point out that reducing water losses in municipal supply systems is a strategic priority for South Africa's water sector. Not only will it help municipalities meet growing demands, but a reduction in water losses will help to improve municipal finances and also reduce the impacts on the environment.

As has been recognised in many countries, the savings made in addressing non-revenue water can cover the cost of the needed interventions within a few years. Yet the challenge can be quite technical and the skills to take this on do not always reside within public municipalities. For instance, an Asian Development Bank report looking specifically at NRW reduction in 2010 suggested that the *"design of NRW reduction contracts is not simple, and very few specialists currently have enough experience to properly design such contracts"* (Frauendorfer & Liemberger, 2010). For these and other reasons, there is growing worldwide interest in performance-based contracts (PBCs) with specialised contractors. PBCs can be used to ensure that targeted results – and value for money - are achieved and that critical skills and knowledge can be sourced from outside the municipality itself.

A recognised obstacle to this approach is the complexity of establishing such performance-based contracts. As such, GIZ, the German development aid implementing agent, with funding from the German, British and Australian governments is supporting the Strategic Water Partners Network (SWPN) by contracting a consultant to develop standard contract(s) that comply with South African administrative requirements and which facilitate the routine implementation of water loss reduction activities[2]. Part of the activities undertaken by the consultant have been – via professional networks and published literature – to review international experience on this issue. This short paper presents some of these findings.

"One of the major issues affecting water utilities in the developing world is the considerable difference between the amount of water put into the distribution system and the amount of water billed to consumers"

(Kingdom et al, 2006)

Global experience to date

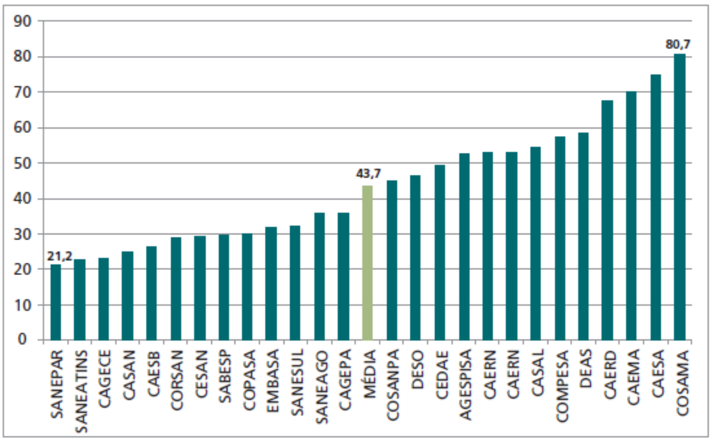
In recent years there has been growing international interest both in non-revenue water reduction (NRW) and in the use of performance-based contracts to do so - the reasons for this are discussed in the two following sections. Most of this experience has been in either developed or 'emerging' economies (e.g. Brazil, Malaysia), but has also been spreading to developing countries (e.g. Vietnam, Kenya).

[2] SWPN is a grouping of the Department of Water Affairs, National Planning Commission, local government, major private sector organisations and related stakeholder bodies, all with commitment to making an impact on reducing unnecessary water demand.

Partly as a consequence, there is a growing literature base that addresses the topic. One of the early, seminal, works was published by the World Bank in 2006, entitled "The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries – How the Private Sector Can Help: A Look at Performance-Based Service Contracting". This looked at the rationale for NRW reduction (along with some of the apparent stumbling blocks) and specifically at four cases where performance-based contracts (PBCs) had been used. These cases were in Ireland, Malaysia, Brazil and Thailand. Since then other countries have also put PBCs in place, including Vietnam, where Ho Chi Minh has had a contract running since 2008. The International Water Association has gone as far as setting up a working group specifically to look the implementation of PBCs.

"The current situation regarding water loss and energy efficiency for Brazil's water utility sector is quite problematic. The average water loss in water utility companies in Brazil is approximately 40 percent (including both physical and apparent losses), and in some companies, losses exceed 60 percent … the high level of water losses reduces companies' revenues, and consequently, their ability to obtain financing and invest in improvements. Additional damages are generated to the environment when water utility companies are forced to seek out new springs or water sources to compensate"

(IFC, 2013)



Source: SNIS 2009

Fig 1: NRW figures in Brazil mirror those in South Africa (Source: IFC, 2013)

Brazil is a country of particular interest in this regard – partly as its municipal water utilities show similar levels of NRW to those we have here in South Africa – and partly due to the legislative and other barriers to implementing PBCs.

Indeed the International Finance Corporation (part of the World Bank Group) published in 2013 a *"Manual for Performance-Based Contracting by Water Utility Companies in Brazil"* which is helpful in looking both at how to put in place such a contract but also, crucially, why to do so.

Why Performance-Based Contracts?

Different authors cite various reasons for adopting PBCs, but the Brazilian manual goes into the topic in quite some detail. The authors of the manual cite four principal reasons for considering a PBC over other possible options (for instance addressing NRW in-house or via the relatively simpler outsourcing of certain tasks, such as leak detection).

"It (a PBC) has the potential to bring rapid improvements for a public water utility, in terms of both increased cash flows and more water available to serve the population, by efficiently harnessing the know-how of the private sector"
(Frauendorfer & Liemberger, 2010)

Firstly there is the issue of **technical know-how**. Addressing NRW – whether physical or commercial losses – can be technically quite challenging and the expertise on how best to do this does not always lie within municipalities themselves. Private sector companies that specialise in this issue are well placed to bring about efficiencies at lower cost and lower risk than in-house approaches, whilst well-structured contracts can include capacity building elements, such that this knowhow is transferred from the contractor to the water utility over the medium- to long-term.

Secondly there is the benefit, in a well-structured contract, of increasing the **incentives** for private contractors to do a good job (and see those gains sustained over time). PBCs allow contractors to be rewarded when things go well and be punished when they don't – which provides added motivation by harnessing the profit motive in aligning the incentives of the contractor and the municipal service provider.

"Under performance-based service contracting, a private company is contracted by the management of a public utility to carry out a comprehensive NRW reduction program, with sufficient incentives and flexibility to ensure accountability for performance and with payment linked to actual results achieved in NRW reduction" (Kingdom et al, 2006)

Thirdly there is the opportunity to **reduce the transaction costs** of outsourcing work to an outside party. By having one large contract, which affords the private sector flexibility to decide how to approach the job, the need to issue many small contracts (and go through difficult design and procurement processes each time) is lessened. A well-designed and managed PBC aligns the incentives of each party and also allocates risks to those best able to handle them – and can therefore offer clear advantages over piecemeal awarding of numerous small tenders for specific pieces of work (such as the installation of pressure reduction valves).

Lastly the Brazilian authors cite the **potential financing capacity** as another reason to consider PBCs. Depending on the nature of NRW reduction activities, they can be expensive; *"reducing physical leakages can require significant capital investment"* (Kingdom et al, 2006). Physical works to reorganise networks, install pressure management technology, etcetera, can indeed require significant capital outlays. In Brazil one of the cited advantages, for municipalities, of PBCs is to a) get the private sector to pay up front for this and spread the repayments over time; and b) use the private sector's better credit rating to get access to 'cheaper' money. How this would play out in South Africa, where much infrastructure development is directly or indirectly funded by national Treasury and few municipalities raise money via bond markets, is perhaps more debatable.

Non-Revenue Water reduction

Before considering performance-based contracts further it is worth quickly looking at the international experience with non-revenue water reduction. NRW is a common term used internationally, although here in South Africa, in a municipal policy environment, many of the activities that NRW reduction includes, fall under the term WC-WDM (an acronym that stands for Water Conservation-Water Demand Management). WC-WDM is not necessarily the same thing, in all contexts as "NRW reduction", but there are certainly large overlaps.

Fig 2: Pressure Management Chamber in Cape Town (source, Meyer et al, 2009)

"Outsourcing of certain water loss reduction activities is not a new practice. Many water utilities in Europe, the United States, and even in developing countries ... use private leak detection contractors to periodically survey their distribution network"

(Frauendorfer & Liemberger, 2010)

There are four aspects of global experience worth considering in more detail:

Firstly there is the issue of **incentives**. NRW reduction (and indeed WC-WDM activities) are not noticeably glamorous. Rather than involving the building of new dams or commissioning of new water treatment plants, NRW reduction involves such humdrum activities as replacing washers on taps, identifying and remedying invisible underground leaks and issuing bills to the right addresses. These are not the sort of events that lend themselves to politicians cutting ribbons and holding press conferences and, arguably because of this, getting political support for NRW reduction programmes is a challenge.

"If the reasons for reducing levels of NRW are so compelling, then why hasn't this widespread and generally well-understood challenge already been tackled and defeated? The reason is that reducing NRW is not just a technical issue but also one that goes to the heart of the failings of public water utilities in developing countries", (Kingdom et al, 2006)

Furthermore, NRW reduction is split across two domains within a typical water utility. There are commercial losses, often handled by the billing department and – in South Africa – often by the municipal treasury. This is basically water that is used but not paid for. Then there are physical losses, including actual water leaking out of the system and into the ground or wasted during treatment processes. This is rather the domain of engineering departments and, if the municipality has one, the water and sanitation line department. As Kingdom and his co-authors put it in 2006, *"engineers and operational staff will assure you that the levels relate solely to commercial losses (that is, there is no leakage problem), while the commercial staff will say that it is all leakage"*! Given the ability for NRW to fall between these 'two stools' and the frequent lack of political support for expenditure on remedying it, getting support from within a municipality can be a real challenge.

Secondly the reduction of NRW is **not just a technical challenge**. Tackling commercial losses means getting customers to pay money they owe for water they have consumed. Doing this is not always a political priority and in some countries (where, for instance, the army and police are the two largest debtors), it can be downright dangerous. It can also mean changing the mindset of both customers and staff – to report leaks when they are noticed, or to take such reports seriously. To be serious about saving water – and not just when drought or water restrictions threaten.[3]

Thirdly, having up to date and **accurate baseline information** is vital. If there is no reliable baseline it is hard to know where - amongst the myriad of possibilities – to target. It is even harder to know when you're succeeding or when a change of course is needed. When it comes to PBCs this need for accurate information is even more pronounced given that remuneration is in part dependent on savings made (and therefore current and future losses need to be known). Given that the majority of municipalities in South Africa struggle to deliver an accurate 'water balance' to provincial and national authorities (something they are legally obliged to do) this is a particular challenge.

<table>
<tr><td rowspan="9">System Input Volume (corrected for known errors)</td><td rowspan="4">Authorised Consumption</td><td rowspan="2">Billed Authorised Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water
(in South Africa this includes the Free Basic Water Allowance, which is paid for from the Equitable Share Transfer)</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorised Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="7">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="5">Water Losses</td><td rowspan="2">Apparent Losses</td><td>Unauthorised Consumption</td></tr>
<tr><td>Customer Metering Inaccuracies</td></tr>
<tr><td rowspan="3">Real Losses</td><td>Leakage on Transmission and/or Distribution Mains</td></tr>
<tr><td>Leakage and Overflow from Reservoirs</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer Metering</td></tr>
</table>

Fig 3: Distribution of real and apparent water losses as water flows through a water distribution system (after IWA "Best Practice")

Lastly, there are certain **financial considerations**. Many experienced observers stress that the decision to implement an NRW reduction program must be based on a detailed cost-benefit analysis based on the actual

[3] Kingdom et al (2006) suggested that, *"not only do new technical approaches have to be adopted, but effective arrangements must be established in the managerial and institutional environment—often requiring attention to some fundamental challenges in the utility"*.

situation of the water utility. This is partly as the length of the payback period can vary greatly depending on which assumptions have been made during the design. Furthermore, to be efficient and to garner economies of scale, NRW programs directed at reducing physical leakages must incorporate fairly sizeable budgets for investment and rehabilitation of the water network. This, plus the need for accurate baseline information and ongoing monitoring, suggest that PBCs will be limited to the larger, more sophisticated utilities (perhaps, for instance, the largest 30 to 40 in South Africa).

"Water loss reduction programs require teams and skilled labor, and the transaction costs associated with performance-based projects do not justify projects with less than 10,000 connections" (IFC, 2013)

Box 1: The State of WC-WDM in South Africa

South African experience in the WC-WDM sector dates back to the late 1990s and has been described in a number of Water Research Commission publications. All of South Africa's metropolitan municipalities are engaged in WC-WDM initiatives, but to date performance based contracting is still relatively untried. Three of South Africa's state-of-the-art pressure-management installations are those at Khayelitsha, Mitchell's Plain and Sebokeng. The latter was installed in 2005 entirely at the service provider's cost as part of South Africa's first performance based WC-WDM contract, and resulted in a saving of R150 million in bulk water costs over the subsequent five year period, The service provider was paid R25 million and incurred costs of R15 million. The service provider company therefore made R10 million (over five years) in return for raising and risking R15 million, and in return for its technical expertise. The client municipality saved R125 million.

Putting in place a Performance-Based Contract: Key learning from international experience

Scoping

The first question to address is what scope any PBC will cover – what activities are to be included, where are interventions to take place, how much of the network is going to be addressed?

Box 2: Defining the project coverage area

"The first and likely most important stage in preparing a successful performance contract is defining the project coverage area". Criteria that may help to define the intervention area include:(a) High rates of losses; (b) Water isolation – i.e. an area where increases in available water can be measured effectively; (c) Socio-economic characteristics that represent all other areas served by the water system; (d) A significant number of connections, e.g. an area with at least 10,000 connections is recommended; e) High production costs, or high costs linked to system distribution or expansion; (f) High distribution costs; (g) Economies of scale.

Adapted from IFC, 2013

As can be seen from the above box, the geographical considerations in scope are important. Notable is the minimum size of intervention that the Brazilian manual on PBCs (from whence this text is taken) recommends. Another important consideration (and one can run counter to arguments for a larger project area) is the preference to have an area of 'strong water isolation' – areas where there are few incoming sources of water – or in other words, an area where the water balance can be reliably calculated.

Other experience, addressing the question of geography, warn against 'cherrypicking' – i.e. allowing the contractor to choose areas in which the easiest gains can be made, areas where intervention to reduce NRW may not necessarily match the priorities of the municipality.

"It should be noted that pressure management cannot be used in every area and therefore it is essential to carry out careful planning to determine the financial feasibility of a proposed project and to ensure that the network will be able to accommodate pressure reduction" (Meyer et al, 2009)

The question of the technical scope of any contract is another key issue. At a workshop held in October 2013 to discuss a template PBC for South Africa, there were strong arguments for pressure reduction as one of the first interventions to focus on. Indeed Cape Town Metro have suggested that *"it is clear that pressure management has been a highly effective tool to reduce water leakage in Cape Town. The total savings … (are) approximately R80 million/yr"* (Meyer et al, 2009).

"A detailed cost-benefit analysis should always be undertaken early to ensure that any proposed NRW reduction program makes financial sense, given the value of water saved (marginal cost or revenue per cubic meter saved) and the cost of developing alternative production sources." (Kingdom et al, 2006)

Nevertheless, in Brazil, one of the key recommendations was to look first at commercial losses, particularly those of commercial and industrial customers. A PBC in Sao Paolo got outside contractors to focus on the meters measuring the consumption of the largest commercial and industrial customers in that city (the utility, SABESP, that serves the São Paulo etropolitan Region, is one of the largest public water utilities in the world and supplies a population of 25 million) – the gains that were made by swapping out old meters and focussing on accuracy of readings in the new ones were considerable indeed. Twenty seven thousand meters were replaced, increasing revenues to the tune of US$72 million over a three year period (a quarter of which was paid to the contractors).

In South Africa it may be harder to get political support to focus on commercial losses – whilst the billing and collection function is often outside the remit of the 'water professionals' in the municipality. Hence most of the discussions around NRW reduction in South Africa (and certainly at the October 2013 workshop mentioned above) have focussed on the reduction of physical losses.

"The starting point is to develop a strategy based on a sound baseline assessment of the sources and magnitudes of the NRW … (considering) … both the short and long terms … it is during strategy development that opportunities … can be identified." (Kingdom et al, 2006)

Risk – reward balance

As a form of Public Private Partnership (PPP) PBCs must be structured in such a way that an appropriate balance is found between risks and rewards. Appropriate and realistic targets need to be set – and the nature and level of risks that a utility seeks to pass to the private sector need due consideration. The more risk that is transferred the higher the price will be. As Kingdom et al (2006) suggested, *"… the challenge will be to find a balance between accountability for end results on one side and a cost-effective level of risk transfer to the private sector on the other side".*

The case studies looked at in the 2006 World Bank document show the importance of considering the full range of incentives (on both sides) when structuring a contract. In Dublin, one of the prime motivations for the contractor doing a good job appears to be reputational – the contract was high profile and the contractor wanted to be seen to have done a good job. In Malaysia one of the motivations was to secure a second stage of contracts. This consideration should apply not only to the private partner but to the public partner too[4].

Using variable incentives

Various observers, including Frauendorfer & Liemberger in their 2010 guide for the Asian Development Bank, suggest allowing a certain proportion of the payments as fixed fee. The argument is that this will reduce the total cost of the contract, by reducing the overall level of risk being taken by the contractor. They suggest a mix

[4] *"In practice, the applicability of performance-based service contracting to an NRW reduction program depends on the level of risk that the private sector is willing to take, which is itself linked to overall country risk, the specific conditions of the water utility, and the detailed contractual form"* (Kingdom et al, 2006)

of fixed fee, performance payments, and payments for materials and civil works. Nevertheless, as they indeed caution, this has to be well balanced. One of the apparent drawbacks of the Dublin case study was that the scope of the contract that was included in 'unit cost pass throughs' was too high. This weakened the performance-related incentives for the contractor and may have overly rewarded them for risks 'not taken'.

"Contract models and level of performance based payments can vary widely from one utility to another"

(Frauendorfer & Liemberger, 2010)

This issue applies not just to the mix of incentives used, but the targets applied (if indeed targets do form a part-basis for remuneration). For *"… inappropriate targets can constrain the delivery of reduced NRW (the target has been achieved, so why make any more reductions?) in a way that a (true) performance-based service contract would not – for which the more reduction, the greater the payment"* (Kingdom et al, 2006)

Box 3: Performance Contracts versus Target Contracts

"Often, target contracts are confused with performance-based contracts. A target contract is a contract where, for example, NRW has to be reduced by a certain, pre-determined volume and penalties / bonuses apply for not achieving/surpassing the target. These are often problematic, as the targets are frequently arbitrary. If the targets are too high, the private sector will not be interested to bid or the risk premium will be substantial. If they are too low, the contract might be disadvantageous for the utility. True performance contracts have no contractual target and the performance fee is directly proportional to NRW reduction".

Sourced directly from Liemberger et al, 2009

Building in sufficient flexibility

A key admonition is to provide the contractor with the necessary flexibility and resources to carry out the many activities needed to make a meaningful impact on NRW levels. If sufficient flexibility is not left to the private partner then full advantage of their technical know-how is usually not being taken advantage of. A further example is where a lack of flexibility in human resources management could make it difficult to reorganize working shifts and pay bonuses for staff who work at night on leakage detection. The advice is to think carefully about how to bring in expertise and not just for the implementation stage but also for its design of any NRW reduction programme.

The key is to arrive at a just exchange - where, in return for taking risks on the performance of the project, contractors are given the latitude to undertake the needed activities according to their experience and judgment.

"Flexibility to accommodate future modifications of the contract is also an important issue, especially for larger contracts with a long duration. Changes might become necessary in the course of the contract and the contractual provisions should allow modifications"

(Frauendorfer & Liemberger, 2010)

Flexibility can however go too far. As mentioned, in Malaysia, the contractor was given the freedom to choose zones anywhere in the network. This, although permitted by the contract, allowed the private contractor to choose zones that did not fully match the priorities of the utility. Equally, latitude on technical considerations may lead a contractor to choosing technologies that cannot be easily sustained once the contract has ended, or realising quick wins at the expense of long-term plans.

The challenge of measuring and monitoring

The need for a reliable baseline has already been stressed. However the data challenge does not stop here – ongoing data collection needs to be up to speed – and managing and acting upon the data being collected is crucial (both during and after any contract). The box below gives some further insights gleaned from an Asian Development Bank manual on NRW reduction.

Box 4: Ensuring sufficient data collection and management

"A lack of understanding of the magnitude and sources of NRW is one of the main reasons for insufficient NRW reduction efforts around the world. This issue has to be addressed when designing a PBC. Only by quantifying NRW and its components and calculating appropriate performance indicators can the NRW situation be properly understood, cost estimates be made, and a fair contract model be developed. It is also of utmost importance to have good pressure and supply time data, as those have a fundamental impact on leakage levels and its reduction/increase potential. The contractor must also have appropriate information systems since, as explained above, NRW management requires collecting a good deal of data. Also, because much of this data is invaluable for the utility over the long term, the contractor must share access to the systems during the contract, and all the systems and data must be handed over at the end of the contract".

Sourced directly from Frauendorfer & Liemberger (2010)

As hinted in Box 4, it is vital to choose the 'right' indicator for measuring performance. This can be doubly complex in a context where water supply is not reliable 24/7. The manual for Brazil suggests four alternatives (from amongst a wider set of options). These include: a) volumes compared to the baseline – with an agreed compensation amount per unit saved; b) a baseline and indicators that measure reduction in operational costs; c) a baseline and indicators based on collections and billing; and d) a combination approach. See pages 28 and 29 in the manual for detailed explanations, including the pros and cons of each.

Procurement & payment considerations

Given the technical nature of the activities needed to reduce NRW and the premium being put on expertise and knowhow, the procurement and selection of the 'right' operator becomes a prime concern. The four cases discussed by Kingdom and his co-authors did not always feature competitive bidding, partly due to the small number of service providers out there that can and want to tackle the contracts, partly because of unsolicited proposals and, in one instance, as the quality of the technical proposal was a major selection criterion with many clauses left for negotiation (although competitively bid, this contract became largely a negotiated one).

Against that, Frauendorfer & Liemberger, in the ADB guide of 2010, recommend that *"ideally, bid evaluation would not only be based on the contract price but also take the quality of the technical proposal into account. This might not always be possible under applicable procurement rules, but at a minimum, there should be a strict prequalification process and pass/fail criteria to ensure that all compliant bidders are capable of successfully undertaking the contract".* This is especially important to dissuade 'fly-by-night' bidders that could do significant harm if 'let loose' on the water network – where non-payment due to lack of non-performance would be scant compensation.[5]

Of course non-performance is not a matter for only the contractor. There is also the risk that the public partner does not fulfil their commitments, which can be many (including giving permission to dig up streets, not interfering in zones where the contractor is working, not undertaking significant initiatives that may affect performance in ways that cannot be easily measured or attributed, etc). A key responsibility in all circumstances is to pay however – and the fact that the private sector only gets paid *after* performing (and once shown to do so) is a non-negligible risk for them.

[5] Although this fact, that the contractor does not get paid (or is at least financially punished) if they do not perform, is one of the appeals of a PBC approach.

Box 5: Payment risk

"A critical aspect of developing performance contracts in Brazil is public companies' ability to pay the contracted parties. As most public water utility companies have low creditworthiness, private companies that provide water loss reduction … services are hesitant to engage in performance contracts because of the high risk of delinquency. In a performance contract, the contracted party carries out all of the activities and investments before receiving its compensation, whereas in traditional contracts, expenditures and investments are concurrent with service provision. In the event of lack of payment, the contracted party can interrupt services as leverage until payment is made. One alternative to mitigate that risk is to issue, in parallel with the performance contract, a fiduciary assignment of receivables as collateral, linked in an escrow account". Sourced directly from IFC, 2013

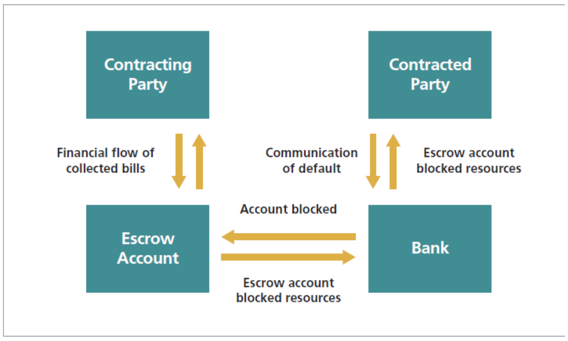


Fig 4: Possible structure of an escrow account (Source: IFC, 2013)

Ensuring sustainability

"Once installed, it is important to monitor the operation of pressure reducing valves and controllers on a regular basis to ensure that all the equipment is operating satisfactorily … staff at the water utility should be trained on the maintenance of pressure reducing valves and on the setting of pressure controllers" (Meyer et al, 2009)

The final recommendation from the global literature and by experienced practitioners is to pay close attention to sustaining any gains made during a PBC. A crucial question to ask therefore is "what are incentives and capacity to sustain the benefits?". These considerations should be at hand during the framing of any contract as activities can be scheduled, within the contract period, that promote sustainability. The box below gives some useful advice from the Asian Development Bank.

Box 6: Planning for beyond the contract

"A utility should consider what will happen after the PBC has been completed. NRW management is not a one-time effort but a never-ending, ongoing activity. For instance, while the contractor under a PBC can remove the backlog of leaks, new leaks will appear afterwards. It is therefore essential that the utility have plans after the PBC expires. If the utility intends to take over NRW management, they must build staff capacity and make all the necessary provisions to enable them to continue in a successful manner. This includes transfer of technology, availability of managerial capacity, sufficient human resources, and long-term budgetary provisions.

Flexibility to accommodate future modifications of the contract is also an important issue, especially for larger contracts with a long duration …. (another) possibility is to continue outsourcing NRW management (or parts of it). This might be done under a subsequent performance contract, but the contractual provision, and the performance assessment and payment mechanism may be substantially different for a contract that only intends to keep NRW at a certain level".

Box directly sourced from Frauendorfer & Liemberger, 2010

Conclusions and reflections

This document has looked at global experience to date in what is a field of growing interest (as indicated by the creation of the IWA working group dealing with PBCs). In 2006, there were few enough examples of PBCs and those were confined to fairly developed economies. Since then, the approach has spread further, reaching Vietnam and Kenya, amongst other places.

There are challenges with implementing performance-based contracts, to be sure – some of these relate to all efforts to reduce non-revenue water, some only to the PBC approach. Though, as urban populations grow and more pressure is put on increasingly scarce water resources, the importance of using more wisely the water we have has gained wider recognition. With this, appreciation of the expertise and knowhow that resides in specialised consultants and contractors has arisen, as well as the undeniable benefits that can be gained by having diverse municipalities harness this.

Key learning points from international experience on PBCs has highlighted the need for careful scoping, for informed design to get the risk – reward balance right and the different ways in which variable incentives can be applied. The need to build in sufficient flexibility has been underlined and the challenge of measuring and monitoring stressed. As with any partnership involving both the public and private sectors, there are serious considerations around both procurement & payment modalities. Given too that PBCs are generally limited in duration the issue of how to transfer the skills and knowhow to the public sector, and to take other measures to ensure sustainability, is an especially crucial one.

Finally, given that the work this documents supports is focussed on the preparation of a draft contract to assist with the adoption of Performance Based Contracts for NRW reduction in South Africa, it seems appropriate to end with two quotes about the contract documents themselves and the preparation and 'management' of this contract (both taken from Frauendorfer & Liemberger's 2010 report on *"The issues and challenges of reducing non-revenue water"* for the Asian Development Bank)

"It is also worth noting that the development of tender documents for PBCs is not an easy task, and public procurement laws in many countries make the development of such contracts very difficult. Thus, water utilities should always consider engaging a specialist advisor to develop the contract and sometimes even to support contract management"

"Contract documents should be well balanced and fair to both parties. There must be a clear delineation between contractor and utility rights and responsibilities. Also, while the contract documents for a PBC must be sufficiently comprehensive, it is advisable to keep things as simple as possible. This applies to the legal language, performance monitoring and measurement mechanism, and reporting and dispute resolution process"

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Annex A: Features of traditional contracts versus performance contracts

The table below provides a comparison between traditional contracts and performance contracts for water loss reduction projects. Five aspects are assessed: (i) implementation investments and expenses; (ii) capital needs; (iii) the contracted party'scompensation; (iv) risk; and (v) technology (IFC, 2013).

Feature	Traditional Contract	Performance Contract
Implementation investments and expenditures	Made by the water utility company	Made by the contracted party
Capital needs	Water utility company must have capital available to invest	Contracted party supplies capital for investments and expenses
Compensation of contracted party	Defined in tender Depends on work completed, not on effective achievement of goals	Depends on performance If contracted party does not achieve goal, it is penalized through lower compensation
Risk	Borne by water utility company	Borne by contracted party
Technology	Company must have know-how to develop necessary actions in detail	Technology can be brought by the contracted party

Fig 5: Features of traditional contracts versus performance contracts (source: IFC, 2013)

Annex B: Benefits and actions to reduce Real and Apparent Losses

Losses	Apparent losses	Real losses
Gains	Revenue growth	Cost reduction Postponement of investments
Benefits	Increase in measured and billed consumption	Lower expenditures on chemical products, energy, and other inputs Water production reduction, serving the same number of people Water supply to more people using the same volume produced
Actions involved	Change of water meters and other meters; elimination of illegal connections All of the savings effectively measured (residential, commercial, and public) Cadastre improvement	Improvement of the network pressure control Improvement of leaks detection Improvement and change of pipelines, connections, valves

Fig 6: Benefits of loss reduction (source: IFC, 2013)

Annex C: Pros and Cons of Four Selected PBCs

Selangor, Malaysia

+ Positive	- Negative
• Demonstration that impressive results can be achieved • Simple but appropriate performance indicator • Clear performance-monitoring procedures	• Negotiated contract, thus Phase 2 not cost-efficient • No true performance contract because of use of fixed target • Scattered zones for physical loss reduction, instead of focusing on one part of the distribution system

Bangkok, Thailand

+ Positive	- Negative
• True performance-based service contracts, with a payment structure based on actual water saved • Good results achieved (at least in two of the three contracts)	• Too much freedom for making major infrastructure investment based on reimbursable payments, with little incentives for cost efficiency • Major mistake in the drafting of the contract (formula for calculating performance, and thus payments)

Sao Paolo, Brazil

+ Positive	- Negative
• Impressive results achieved • Excellent examples for commercial loss-reduction contracts • Appropriate performance indicators • Clear performance-monitoring procedures	• Nothing material

Dublin, Ireland

+ Positive	- Negative
• Volume of physical loss reduction sufficient to end the water crisis and reestablish continuous supply throughout the system in only two years • A robust system for active leakage control established and currently continued by the client	• Missing baseline and an imprecise mechanism to calculate savings • Weak penalty/bonus formula provided limited incentives • Large cost elements reimbursed on a cost-plus basis • Unrealistically high performance target

Source: Kingdom et al, 2006 – direct snapshots

The form of contract as envisioned in the Model Contract is not a Public Private Partnership. However, certain structuring of such a contract could possibly mean that it would fall under the definition of a PPP under South African legislation. The requirements of such legislation is summarised in the following practice note.

Public Private Partnerships – Practice Note

compiled by Peter Ramsden

1. Public Private Partnership (PPP) is broadly defined. It includes a transaction where a private party performs a municipal function on behalf of the municipality, assumes substantial financial, technical or operational risks and receives a benefit through a consideration paid by a municipal entity or the charging of fees. (see definition in the PPP regulations below).

2. A comprehensive feasibility study is a pre-requisite of a PPP. The matters that must be covered in the feasibility study are set out in s 120(4) of the Public Finance Management Act and Regulation 3 of the PPP Regulations. The feasibility study must explain the strategic and operational benefits of the public-private partnership for the municipality in terms of its objectives as well as the effect on revenue flows of the municipality.

3. The accounting officer of a municipality must inform National Treasury before a municipality initiates a feasibility study for a public-private partnership (see Regulation 2 of the PPP Regulations).

4. Before competitively procuring PPP bids and before concluding a PPP agreement, the accounting office of the municipality (the accounting officer) must obtain the views and recommendations of the National Treasury and the relevant provincial treasury on the bid documents and the agreement respectively.

5. Only the accounting officer of a municipality may sign a public-private partnership agreement on behalf of the municipality, and may only do so if the LG Municipal Finance Management Act and the PPP regulations are complied with.

6. It is evident that this process is beyond the internal capability of most municipalities other than the metros (cities). Most municipalities will need to appoint a consultant (Professional Services Provider) as a transaction advisor to prepare the feasibility study and the bid documentation and to manage the procurement.

LOCAL GOVERNMENT: MUNICIPAL FINANCE MANAGEMENT ACT 56 OF 2003

Part 2

Public-private partnerships (s 120)

120 Conditions and process for public-private partnerships

(1) A municipality may enter into a public-private partnership agreement, but only if the municipality can demonstrate that the agreement will-

(a) provide value for money to the municipality;

(b) be affordable for the municipality; and

(c) transfer appropriate technical, operational and financial risk to the private party.

(2) A public-private partnership agreement must comply with any prescribed regulatory framework for public-private partnerships.

(3) If the public-private partnership involves the provision of a municipal service, Chapter 8 of the Municipal Systems Act must also be complied with.

(4) Before a public-private partnership is concluded, the municipality must conduct a feasibility study that-

(a) explains the strategic and operational benefits of the public-private partnership for the municipality in terms of its objectives;

(b) describes in specific terms-

(i) the nature of the private party's role in the public-private partnership;

(ii) the extent to which this role, both legally and by nature, can be performed by a private party; and

(iii) how the proposed agreement will-

(aa) provide value for money to the municipality;

(bb) be affordable for the municipality;

(cc) transfer appropriate technical, operational and financial risks to the private party; and

(dd) impact on the municipality's revenue flows and its current and future budgets;

(c) takes into account all relevant information; and

(d) explains the capacity of the municipality to effectively monitor, manage and enforce the agreement.

(5) The national government may assist municipalities in carrying out and assessing feasibility studies referred to in subsection (4).

(6) When a feasibility study has been completed, the accounting officer of the municipality must-

(a) submit the report on the feasibility study together with all other relevant documents to the council for a decision, in principle, on whether the municipality should continue with the proposed public-private partnership;

(b) at least 60 days prior to the meeting of the council at which the matter is to be considered, in accordance with section 21A of the Municipal Systems Act-

(i) make public particulars of the proposed public-private partnership, including the report on the feasibility study; and

(ii) invite the local community and other interested persons to submit to the municipality comments or representations in respect of the proposed public-private partnership; and

(c) solicit the views and recommendations of-

(i) the National Treasury;

(ii) the national department responsible for local government;

(iii) if the public-private partnership involves the provision of water, sanitation, electricity or any other service as may be prescribed, the responsible national department; and

(iv) any other national or provincial organ of state as may be prescribed.

(7) Part 1 of this Chapter applies to the procurement of public-private partnership agreements. Section 33 also applies if the agreement will have multi-year budgetary implications for the municipality within the meaning of that section.

MUNICIPAL PUBLIC-PRIVATE PARTNERSHIP REGULATIONS

Act

Published under

GN R309 in GG 27431 of 1 April 2005

[with effect from 1 April 2005]

The Minister of Finance, acting with the concurrence of the Minister for Provincial and Local Government, has in terms of section 168 of the Local Government: Municipal Finance Management Act, 2003 (Act 56 of 2003), made the regulations as set out in the Schedule.

SCHEDULE

1 Definitions

In these Regulations, unless the context indicates otherwise, a word or expression to which a meaning has been assigned in the Act, has the same meaning, and-

'Act' means the Local Government: Municipal Finance Management Act, 2003 (Act 56 of 2003);

'activity', in relation to a public-private partnership, means the municipal function or the management or use of municipal property, or both, which is or is to be outsourced to a private party in terms of a public private partnership agreement;

'affordable', in relation to a public-private partnership agreement, means that the financial obligations (if any) to be incurred by a municipality in terms of the agreement can be met by-

(a) funds designated in the municipality's budget for the current year for the activity outsourced in terms of the agreement;

(b) funds destined for that activity in accordance with the future budgetary projections of the municipality;

(c) any allocations to the municipality; or

(d) a combination of such funds and allocations;

'municipal function' means-

(a) a municipal service; or

(b) any other activity within the legal competence of a municipality;

'municipal property', in relation to a municipality, includes any movable, immovable or intellectual property, owned by or under the control of-

(a) the municipality; or

(b) a municipal entity under the sole or shared control of the municipality;

'private party' excludes-

(a) a municipality;

(b) a municipal entity; or

(c) an organ of state, including an institution listed in any of the Schedules to the Public Finance Management Act, 1999 (Act 1 of 1999);

'project officer' means a person appointed in terms of regulation 7(1);

'public-private partnership' means a commercial transaction between a municipality and a private party in terms of which the private party-

(a) performs a municipal function for or on behalf of a municipality, or acquires the management or use of municipal property for its own commercial purposes, or both performs a municipal function for or on behalf of a municipality and acquires the management or use of municipal property for its own commercial purposes; and

(b) assumes substantial financial, technical and operational risks in connection with-

(i) the performance of the municipal function;

(ii) the management or use of the municipal property; or

(iii) both; and

(c) receives a benefit from performing the municipal function or from utilising the municipal property or from both, by way of-

(i) consideration to be paid or given by the municipality or a municipal entity under the sole or shared control of the municipality;

(ii) charges or fees to be collected by the private party from users or customers of a service provided to them; or

(iii) a combination of the benefits referred to in subparagraphs (i) and (ii);

'transaction advisor' means a person appointed in terms of regulation 2(1)(b);

'value for money', in relation to a public-private partnership agreement, means that the performance of a private party in terms of the agreement will result in a net benefit to the municipality in terms of cost, price, quality, quantity, risk transfer or any combination of those factors.

2 Initiation of feasibility studies

(1) Before a municipality initiates a feasibility study for a public-private partnership contemplated in section 120(4) of the Act, the accounting officer of the municipality must-

(a) notify the National Treasury and the relevant provincial treasury in writing of the municipality's intention, together with information on the expertise within the municipality to comply with that section of the Act; and

(b) if requested to do so by the National Treasury or the relevant provincial treasury, appoint a person with appropriate skills and experience, either from within or outside the municipality, as the transaction advisor to assist and advise the municipality on the preparation and procurement of the public-private partnership agreement.

(2) Subregulation (1) also applies when a municipality in terms of section 78(2) of the Municipal Systems Act explores the provision of a municipal service through an external mechanism to be appointed in terms of a public-private partnership agreement.

3 Additional matters to be addressed in feasibility studies

(1) A feasibility study conducted in terms of section 120(4) of the Act, in addition to the matters specified in that section, must-

(a) identify and define the activity which the municipality proposes to outsource to a private party;

(b) assess the needs of the municipality in respect of such activity, including-

(i) the various options available to the municipality to satisfy those needs; and

(ii) the advantages and disadvantages of each option;

(c) assess the projected impact of the proposed outsourcing of the activity to a private party on the staff, assets, liabilities and revenue of the municipality or a municipal entity under the sole or shared control of the municipality, which must include an assessment of-

(i) the number of officials of the municipality or such municipal entity that would become redundant as a result of the outsourcing of the activity;

(ii) the cost to the municipality or such municipal entity of any staff retrenchments or the retention of redundant staff;

(iii) any assets of the municipality or such municipal entity proposed to be placed under the control of the private party;

(iv) any assets of the municipality or such municipal entity that would become obsolete as a result of the outsourcing of the activity;

(v) any liabilities of the municipality or such municipal entity proposed to be assigned to the private party;

(vi) any debt of the municipality or such municipal entity attributed to the activity to be outsourced which the municipality or such municipal entity would retain; and

(vii) any revenue to be foregone by the municipality or such municipal entity as a result of the outsourcing of the activity; and

(d) recommend an appropriate plan for the procurement of the proposed public-private partnership agreement, if outsourcing of the activity is the preferred option.

(2) An assessment in terms of subregulation (1)(b) must show comparative projections of-

(a) the full costs to the municipality for the activity if that activity is not outsourced through a public-private partnership agreement; and

(b) the full costs to the municipality for the activity if that activity is outsourced through a public-private partnership agreement.

(3) Subregulations (1) and (2) need not be complied with if the activity which the municipality proposes to outsource is a municipal service in respect of which an assessment in terms of section 78(3)(b) and a feasibility study in terms of section 78(3)(c) of the Municipal Systems Act have already been carried out, provided that-

(a) such assessment and feasibility study cover the matters referred to in subregulations (1) and (2); and

(b) the documents reflecting the results of such assessment and feasibility study are included in the documents submitted to the council in terms of section 120(6)(a) of the Act.

4 Procurement of public-private partnership agreements

(1) When complying with Part 1 of Chapter 11 of the Act, the accounting officer of the municipality must solicit the views and recommendations of the National Treasury and the relevant provincial treasury on-

(a) the proposed bid documentation at least 30 days before bids are publicly invited; and

(b) the evaluation of the bids received and of any preferred bidder at least 30 days before any award is made.

(2) An award of a public-private partnership agreement-

(a) may be made only after the process set out in section 120(6) of the Act has been completed; and

(b) is subject to compliance with section 33 of the Act.

(3) When complying with section 120(6)(c)(i) of the Act, the municipality must specifically solicit the views and recommendations of the National Treasury on-

(a) the proposed terms and conditions of the draft public-private partnership agreement;

(b) the municipality's plan for the effective management of the agreement after its conclusion; and

(c) the preferred bidder's-

(i) competency to enter into the public-private partnership agreement; and

(ii) capacity to comply with his or her obligations in terms of the public-private partnership agreement.

(4) A provincial treasury is a prescribed organ of state for purposes of section 120(6)(c)(iv) of the Act, and when complying with this section the municipality must specifically solicit the views and recommendations also of the relevant provincial treasury on the matters set out in paragraphs (a) to (c) of subregulation (3).

5 Basic requirements to which public-private partnership agreements must comply

(1) A public-private partnership agreement between a municipality and a private party must-

(a) provide value for money to the municipality;

(b) be affordable for the municipality;

(c) describe in specific terms the nature of the private party's role in the public-private partnership;

(d) confer effective powers on the municipality-

(i) to monitor implementation of, and to assess the private party's performance under, the agreement;

(ii) to manage and enforce the agreement;

(e) impose financial management duties on the private party, including transparent processes relating to internal financial control, budgeting, accountability and reporting;

(f) provide for the termination of the agreement if the private party-

(i) fails to comply with terms or conditions of the agreement; or

(ii) deliberately provides incorrect or misleading information to the municipality;

(g) restrain the private party, for the full period of the agreement, from offering otherwise than in accordance with the agreement an employment, consultancy or other contract to a person-

(i) who is an official of the municipality or a municipal entity under the sole or shared control of the municipality; or

(ii) who was such an official at any time during a period of one year before the offer is made; and

(h) restrain the private party, for a period of three years, from offering an employment, consultancy or other contract to an employee of the municipality directly involved in the negotiation of the agreement;

(i) comply with section 116(1) of the Act.

(2) Any municipal employee participating in the negotiation of the public-private partnership agreement may not be employed by the private party in the public-private partnership for a period of three years.

6 Signing of public-private partnership agreements

(1) Only the accounting officer of a municipality may sign a public-private partnership agreement on behalf of the municipality.

(2) The accounting officer may not sign a public-private partnership agreement unless section 33 of the Act has been complied with.

7 Project officers

(1) As soon as a municipality initiates a project that may be a public-private partnership, the accounting officer must appoint a person with appropriate skills and experience, either from within or outside the municipality, as the project officer for the public-private partnership.

(2) The project officer is responsible for performing-

(a) the duties set out in section 116(2)(c)(i) and (ii) of the Act; and

(b) any other duties or powers delegated by the accounting officer to the project officer in terms of section 79 of the Act.

8 Responsibilities of accounting officers

The accounting officer of a municipality which has entered into a public-private partnership agreement must, in addition to complying with section 116(2) of the Act, take all reasonable steps to ensure-

(a) that the outsourced activity is effectively and efficiently carried out in accordance with the agreement;

(b) that municipal property which is placed under the control of the private party in terms of the agreement is appropriately protected against forfeiture, theft, loss, wastage and misuse; and

(c) that the municipality has contract management and monitoring capacity.

9 Amendment of public-private partnership agreements

(1) A public-private partnership agreement may be amended by the parties provided-

(a) section 116(3) of the Act has been complied with; and

(b) the amendment is consistent with the basic essentials of public-private partnership agreements set out in regulation 5 and other applicable provisions of these Regulations.

(2) At least 60 days before a public-private partnership agreement is amended, the accounting officer must solicit the views and recommendations of the National Treasury and the relevant provincial treasury on the reasons for the amendment. The period may be shortened if the National Treasury and relevant provincial treasury respond earlier.

10 Municipal entities

No municipal entity may initiate, procure or enter into a public-private partnership agreement on its own or on behalf of its parent municipality, but may be a party to a public-private partnership agreement initiated, procured and entered into by its parent municipality.

11 Exemption

A municipality that has commenced with the procurement of a public-private partnership prior to 1 December 2004 is exempt from these Regulations in relation to that partnership, provided the agreement is concluded by 30 June 2005.

12 Commencement

These Regulations take effect on 1 April 2005.

Water Conservation and Water Demand Management

Case Study

Emfuleni Local Municipality, South Africa
Development Partnership Project between Emfuleni, Sasol and GIZ using a Performance Based Contract

Objective:	To link the need for a municipal water utility to reduce its water demand with the need for a private sector company to increase its water security through a partnership to jointly invest in municipal water loss reduction thus reducing the municipality's costs and increasing both its resident's and the private company's water security.	
Partners	Emfuleni Local Municipality	www.emfuleni.gov.za
	Sasol New Energy Holdings Ltd	www.sasol.com
	GIZ Transboundary Water Management in SADC	www.giztranswatersadc.org
Duration:	April 2012 – June 2014	

<u>Problem</u>: A municipality must reduce its water consumption and is losing over 40% of treated water through leaking pipe networks and wasteful use. A local highly water-intensive business has already invested heavily in optimizing its water use but further investments will only achieve small efficiency gains. How can business and a municipality work together to create the highest shared benefit and achieve the municipal target of reducing water loss by 15%?

Background

Emfuleni Local Municipality lies within the Orange-Senqu river basin adjacent to its main tributary, the Vaal River. The demand on this important water resource already exceeds its sustainable supply. Municipalities across the area purchase their potable water from Rand Water whose source of supply is the Vaal River. The municipalities then provide this water to residential and commercial customers but non-revenue water (NRW) percentages across the systems are high, ranging from 20% to over 40%. Emfuleni has an NRW in excess of 40% equating to a loss of more than 30 million m^3 of water per annum. Like many municipalities, Emfuleni does not have the necessary capacity, instruments or resources to implement the required water conservation and demand management actions. This not only threatens the water supply of the residents, but also poses water risks to businesses, restricts economic development and adds to the strain on the available resource.

Sasol Limited is a global group of companies active in fuel, chemical, coal mining, oil and gas exploration and related activities, as well as manufacturing and marketing operations with an annual turnover above €12 billion, employing over 33,000 people.

A high percentage of Sasol's South African based operations are dependent on the water supplied from the Vaal River and it has already made significant investments to reduce its water use and to improve its water security. It now faces diminishing returns as the costs for further improvements are increasing compared to additional gains in water saving. The need to comply with possible imposed water-reduction targets is a significant threat to the company and the security of its water supply has been identified as a risk to future operations.

It is therefore seen as good business sense to redirect these investments to help other users make larger savings. This approach could then lead to significant water savings, and at the same time reduces water risks, both to Sasol and to all users of the resource, including the municipalities.

Project Partnership

The need to offer assistance to Emfuleni was jointly identified by GIZ and Sasol who agreed to jointly approach the municipality on the matter. After a series of discussions and negotiations, Emfuleni, Sasol and GIZ entered into a Memorandum of Understanding (MoU) to implement a Water Conservation and Water Demand Management (WCWDM) project. Under this MoU, initial seed funding of R5 million was made available through the SADC Transboundary Water Management Programme (funded by the German, UK and Australian Governments and managed by GIZ) and Sasol also made R5 million available. The Municipality in turn agreed to ring fence the savings created by the reduction in water use to be re-invested to augment the partnership seed funding and to continue with the water conservation interventions. The MOU established the following project structures:

- Project Steering Committee - A committee consisting of senior representatives from the Municipality, Sasol and GIZ charged with the responsibility of providing strategic direction regarding the project, high level decision making and for project fund allocation and prioritization.
- Community Stakeholder Committee - A committee consisting of community representatives, the Municipality, Sasol and GIZ with the main aim of managing engagement with the community and to achieve their co-operation and buy-in during the execution of this project.
- Project Management Committee - A committee consisting of representatives from the Municipality, Sasol and GIZ together with the appointed Managing Consultant with the main aim to oversee and manage the execution of the Project.

The underlying principle of the project co-operation was that the seed funding would be used to initiate the project and create financial savings for Emfuleni. These savings would then be utilized to continue and grow the project thus providing Emfuleni with a self-funding process that would allow them to further address water loss problems. The funding from GIZ and the SADC Transboundary Water Project would contribute to reducing the demand on the Orange-Senqu river basin and the funding from Sasol will contribute to the improvements in their level of water security.

Project Scope

Emfuleni has a population of approximately 720,000 in 220,000 households. It also supports considerable industry and commercial operations. In the financial year 2011/12 it purchased some 82 million m^3 per annum of potable water from Rand Water at a cost of around R410 million. Historical trends showed that the annual growth in water demand for the municipality was between 4% and 5% per annum.

Phase 1 of the project consisted of 15 wards covering 41,000 properties which contained 68,000 households representing a population of 230,000. Phase 2 consisted of a further 11 wards covering 32,000 properties which contained 49,000 households representing a population of 170,000. One of the features of the area was a large number of properties on which there were several houses with shared communal taps and shared outside toilet facilities. A second important feature was that water consumption was been charged on a deemed-use basis with few meters being read. This resulted in extremely low payment levels being recorded for the area. The combined project area (Phases 1 and 2) represented around 40% of the total water use of the municipality.

The priorities of the project were to:

- Reduce physical water losses in prioritised areas through pressure management and the repair of leaking household water systems;
- Provide education and awareness to the community regarding water conservation issues; and
- The training and development of community plumbers recruited locally.

Contract

Following a full competitive tender and evaluation process, WRP Consulting Engineers (Pty) Ltd (in association with Gandlati Strategic Equity (Pty) Ltd and Chuma Development Consultants) were appointed as the Managing Consultant. The principle of the contract was that the Managing Consultant would be paid for its time (at a lower than normal rate) and for all expenses incurred as per a priced bill of quantities. Additionally a performance bonus would be paid as follows:

- For up to a 10% saving in water costs – 10% of the saving
- For between 10% and 25% saving – 20% of the saving between 10% and 25%
- The performance bonus level was capped at 25%

The first priority of the project was to establish the water use baseline for the area based on a history of the bulk water supply. A supply area was identified which was served by three Rand Water metered supply points - the project area formed the main constituent part of this area. This allowed the use of the historical supply records as well as providing independent third-party meters and meter reading to obtain monthly supply figures to the area. Given that this historical supply information was available over a multi-year period it was possible to extrapolate the existing water consumption data to create a baseline for the measurement of savings over the duration of the project period. After excluding certain outlier numbers from the calculation, a straight line fit into the actual consumption figures gave an agreed baseline that indicated an annual growth in consumption of around 5%. It should be noted that the baseline is not a single fixed figure but is a line on a graph that reflects the 5% annual growth on a month to month basis. This line was also converted to a specific monthly forecast of the anticipated water consumption without the effect of the WCWDM intervention.

Awareness and Education Component

The Managing Consultant, with guidance and assistance from local Ward Councillors identified, appointed and trained one Water Conservation Warrior from each ward. The Warriors were given uniforms and identification cards and in the course of the project (Phases 1 and 2) visited some 100,000 households managing to speak to residents in 56,800 of them while leaving leaflets at the other houses. Through their surveys it transpired that 40% of households accessed reported some form of water loss issue.

The Warriors also conducted regular awareness workshops and discussions at various clinics, shopping centres, pre-schools and community based organisations – 300 workshops or discussions have been held attended by some 30,000 people. They also participated in the various municipal functions throughout the period, including Water Week, Youth Day, etc., where water conservation and demand management principles were talked about and promoted. Caretakers at schools were given basic leak repair training by accredited plumbing trainers to assist with speedier leak repairs at these schools.

Household Leak Repair

The Managing Consultant, using a competitive tendering process, procured the services of three locally based plumbing contractors to undertake the household leakage repair work. Based on the tenders, the rates of the three selected contractors were balanced out so that each of them was working at the same rates. The contractors were also required to appoint two suitable persons per ward and to train them as plumbers' assistants. In addition to on-the-job training these assistants also received a one week accredited plumbing course through the project.

The work of the plumbers was to visit each property and to identify and fix basic leaks in the water supply system. Typically this involved a simple replacement of washers for a tap or toilet cistern but could also involve a replacement tap (plastic to reduce the chance of further loss) or the cistern fittings. During this process the plumbers would also identify and, where possible, fix leaking service pipes or meters.

The cost of the plumbing teams averaged out to around R120 for each house where a repair was carried out. As a typical household with a leak or wasteful use could consume up to 200 m^3 of water (cost equivalent - R1,000) in one month, this was a cost effective intervention.

During the project the following work was undertaken:

- The plumbing teams visited the properties covering some 100,000 households where they replaced 60,000 tap washers, 70,000 toilet inlet washers and 65,000 toilet outlet washers;
- 50 schools have been visited and repairs made to their internal plumbing systems;

Repairs to the Municipal System

The original focus of the project had been to only undertake repairs to the household systems, i.e., after the meter or main supply point. It soon became clear, however, that it would also be necessary to assist the municipal staff with attending to leaks on the municipal system. This resulted partly due to the success of the awareness component of the project which resulted in an increased level of complaints about leaks to the municipality. It was also found that other contractors in the area were damaging supply pipes and, rather than reporting the damage, concealing the fact by channelling the water to sewers or stormwater systems. As this was creating high levels of water loss this was also included, with the approval of the municipality, in the work of the plumbing teams.

Pressure Management

The appointed Management Consultant had the benefit of having had previous pressure management experience in the area including having been an integral part of installing a major pressure management installation (under a PPP styled contract) that controlled the main supply to the project area. This knowledge allowed them to quickly identify problem areas and to implement remedial action. Most zones were controlled by pressure reducing valves but often the settings had been changed and not reset due to the need to address intermittent water shortages in different areas. Linked with this was the need to identify situations where maintenance work had left valves, which were critical to maintain the integrity of pressure and supply zones, open or closed. An important tool in this work was the existing telemetry system which allows both the municipal officials and the Managing Consultant to continually monitor the supply flows and pressures at critical points in the system.

Local Employment and Training

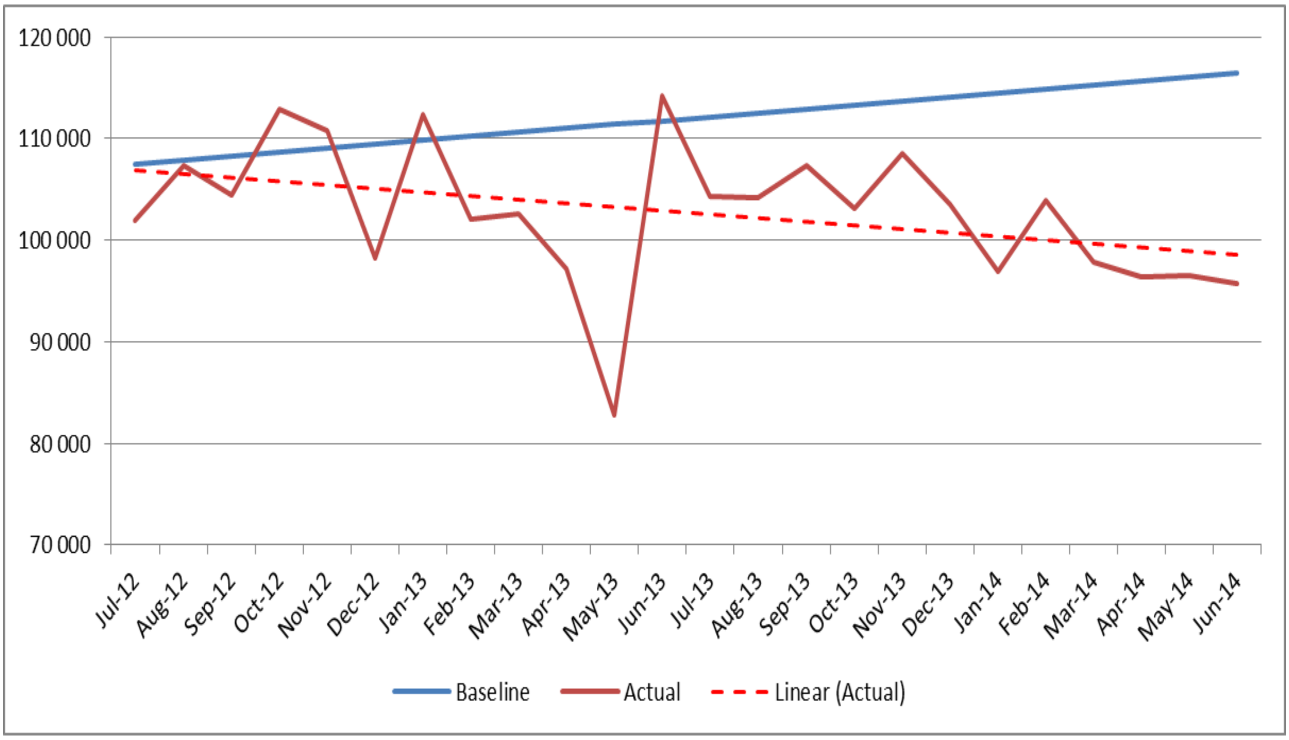
- A total team of over 90 local people was employed on the contract;
- 26 Water Conservation Warriors and 37 Plumbers and Plumbers' Assistants were appointed locally and trained. Each one of these attended a short certificated course on plumbing;
- 3 locally recruited engineering technicians were employed by the Managing Consultant;
- The gender mix of local employment has been in the order of 50/50.

Results Achieved

The combined effect of the above interventions for the two financial years covered by the project resulted in a reduction in water use of 6.85 million m^3 against the baseline – a saving of R37 million on the municipal water bill over the two years. More importantly, however, for the last six months of the project the anticipated demand of 21 million m^3 was reduced to an actual consumption of 17.5 million m^3, a reduction of 16.7%. Relating this to the next financial year (2014/15) this will create a reduction in water demand of at least 7 million m^3 and a reduction in water costs to the Municipality of over R40 million.

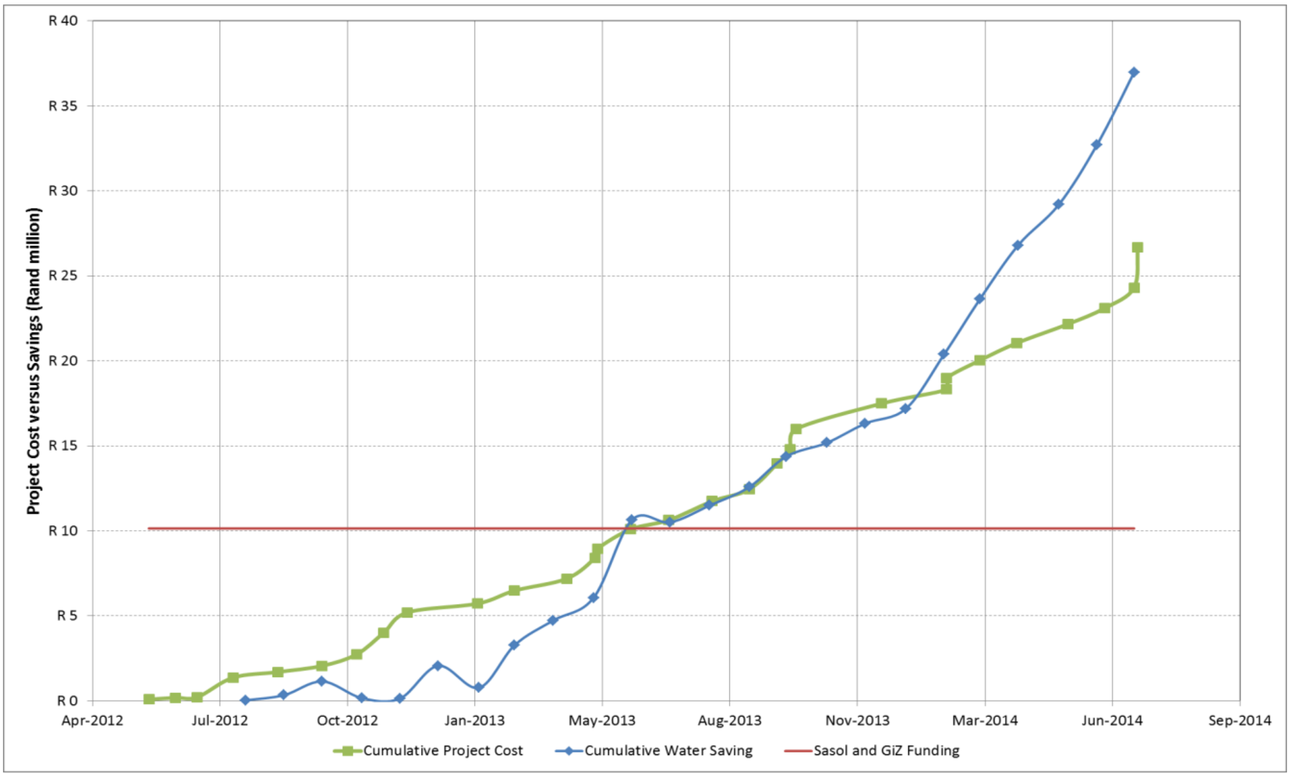
A further benefit was that the night flow volumes within the project area were reduced by 10% as a result of the project. This will result in a reduction in the inflow to the sewage treatment plant which is already hydraulically overloaded. It is also estimated that a CO_2 saving of 10,000 tons was generated due to the interventions.

The comparison of the project water demand baseline with the actual monthly consumption (shown as the average daily demand per month) is shown on the following graph:



Against the direct savings of R37 million over the two year life of the project, the total project cost was R27 million of which R5 million was contributed by GIZ, R5 million by Sasol and the balance of R17 million was paid by the Municipality out of the savings achieved.

The cash flow showing expenditure versus cost savings is shown in the following graph:



The cash flow graph above shows the importance of the seed funding that covered the initial cost of the work that had to be implemented before the first positive savings were realised.

One of the successes of this contract was the pro-active approach adopted by the appointed Managing Agent. The initial requirements were to look at priority areas covering some 20,000 properties in Phase 1. The Managing Consultant eventually addressed over 70,000 properties and was constantly identifying areas where further savings could be achieved. This has been reflected in the benefits achieved for the Municipality but it was also in the Managing Consultants own interest to maximise the performance bonus that it could receive.

In addition to the direct measurable results mentioned above, there are a number of indirect benefits:

- The level of awareness and understanding of the need to conserve water has increased in the target areas;
- The house owners are starting to take responsibility for fixing leaks in their houses themselves;
- This project has paved the way for the Municipality to roll out improved metering and billing practices in the sense that the community is now more aware of their use and, through the curbing of unnecessary high usage, their potential bills have been reduced;
- Formal up-skilling and employment opportunities for 90 local residents were created by the project;
- This project has also improved the capacity of the Municipality to execute large water conservation and demand management projects in their jurisdiction;
- The waste water treatment works serving this area has previously been assessed as being hydraulically overloaded as well as receiving a diluted quality of effluent that is not optimal for processing purposes. A major factor in this is the volume of potable water entering the sewerage system due to leaks and wastage. A reduction in such leaks and wastage will improve the operating conditions of the waste water treatment plant;
- Sasol, as the private sector partner, has been recognised as a leader and major role player in the principles of water stewardship and development partnership projects, both internationally and locally, by public authorities and institutions as well as by their peers.

Awards Received

The project has been recognised through the following awards:

- Mail and Guardian, 2013 - Water Management Award to Sasol´s Water Sense programme - the Emfuleni project forms a major component of this programme.
- South African Department of Water Affairs: Water Sector Awards on Water Conservation and Water Demand, 2013 - First place in the category: Local Municipalities.
- Global Water Awards, 2014 – Distinction in the Corporate Water Stewardship category

Lessons Learned

While the various partners and, in particular, the appointed Managing Consultant's team, brought a considerable amount of prior knowledge to this project, there were still a number of valuable lessons that were learned and that are recorded here to assist and advise other similar projects.

The Baseline of Water Use

The ability to determine the baseline of historical water use is important to be able to accurately determine the water savings achieved. This baseline has to be clearly explained to all officials and councillors in the municipality (including those newly appointed during the project) in that it is not a fixed amount but rather an agreed projection of anticipated water use over a period. The annual percentage increase in such water use has also got to be clearly defined as this can be very different from the normally used growth in the number of houses. (In this project household growth was at 1% per annum while water demand growth was at 4.5% per annum)

Where a municipality is purchasing water from a third party, this allows for a good record of the history of water consumption as well as a simple calculation to determine the monetary value of such consumption (and of the savings being achieved) as well as providing an independent quantification of the actual water use. If cost saving is the driving force of the project it has to be clearly understood that this is as much a financial project as a technical one. For this reason the senior financial officials have to be an integral part of the project team and have to be supporters of the project from start to end.

Measurement of Actual Water Use

Unexplained monthly fluctuations in demand will occur and will complicate the measurement of savings. For this reason it is beneficial to have check meters operating at the agreed measuring points. Some of the specific problems encountered on this project were:

- Significant differences in the monthly consumption figures caused by different periods between reading dates (varying between 27 and 32 days – a potential 15% swing). This was addressed by converting the monthly figures to average daily figures.
- The municipality was constructing a new reservoir outside the project area but served from the same supply point. Due to construction problems the reservoir was filled and then had to be emptied on several occasions. This was addressed by installing a meter on the supply point so that this supply could be deducted from the calculations and also allowing the municipality to recover the costs from whoever had caused the additional water use.
- The bulk supplier (Rand Water) changed the meters on the main supply points as part of a 5 yearly renewal programme. It transpired that one of the meters had been under-reading and the usage through this meter increased by about 12%. This meant that our baseline readings had been too low and the savings measured against the project were reduced. While this was not enforced, the contract with the Managing Consultant did have a clause that would have allowed this to be a reason for re-negotiation of the performance bonus.
- In addition to the above reasons for which there were explanations there were still inconsistencies in the graph of the monthly water use that could not be explained.

Community Awareness and Education

Community engagement through the awareness and education components is a key element of this type of programme and should always be given high priority. The identification and appointment of the Water Conservation Warriors (or Community Water Liaison Officers to give them a more usual title) was a proposal that came from the Managing Consultant. Their job was to visit all the households in the area to explain what the project was doing and to talk about the need to save or not waste water by fixing leaks inside and outside the houses and to report leaks to the municipality. This proved to a considerable success and certainly ensured that the community were behind the project right through the programme.

Although appointed as one for each ward they generally worked in groups of two or more for security reasons. The generally even mix between male and female Warriors also worked out as a benefit as females were generally more accepted in some environments while the males fitted in to others. Once a week they would get together as a group and visit a school or some form of community gathering to promote the need to respect and save water.

Various forms of media were used to support the programme including picture based pamphlets printed in the local languages. It was the opinion of the team, however, that the most successful form of media was the local radio stations.

The main focus area of this project was to work with the community in respect of education and awareness as well as to repair in-house leaks. This was achieved. For such work to be sustainable, however, it will eventually require the introduction and enforcement of metering and payment systems which is a potential confrontational issue and therefore better dealt with as a separate exercise.

The support of the senior councillors responsible for water services and of the local ward councillors was critical in ensuring the support from the communities. These councillors were given short courses on water management and were involved in the identification of candidates for the various employment opportunities. They were also asked to assist in maintaining the project momentum through ensuring that water conservation remains a standing item on their community meeting agenda's. Their ongoing support was also important on the out-reach activities performed by the Water Conservation Warriors as well as the workshop activities undertaken by the project team including road-shows and mass community workshops. Ideally they should spearhead these activities and be present with the team when the activities are carried out.

Schools

The schools in the area were initially targeted with a view to making the learners aware of the need to conserve water and to ensure that, at a young age, they were made aware of the importance of preserving this scarce resource. During these visits it was identified that many schools had problems with the billing for water from the municipality. Critical support was therefore provided to the schools in respect of identifying where their meter was, helping them to understand the water bill and what factors affect it (some had very high consumption per learner) as well as training the caretakers to undertake basic plumbing repairs and to therefore deal with leaks as soon as they occurred.

Pressure Management

The correct application of pressure management is an internationally accepted practice that can have a significant impact on reducing water losses through leaks and wastage – this is particularly the case in Southern Africa where pressures are generally higher than necessary. During this project pressures in the various supply zones were optimised. Occasionally, however, this set up was compromised as a result of municipal plumbers having to close and or open valves to undertake required emergency or planned repair work and not returning the valves to their original settings. While this was generally rectified quickly during the contract, there is a concern that the knowledge levels among all municipal technical staff are not adequate so that the pressure control will always be operated effectively.

Control over Other Contractors

A large number of cases were found where contractors working for the other departments of the municipality or other service providers had damaged pipes and caused leaks in the water supply but had not reported the problem. In some cases work had even been done to channel the running water to a stream or into a sewer. It is therefore important that the municipality properly enforces the way leave system and should deploy resources as regularly as possible to monitor work conducted in the municipality by contractors to avoid problems which could result from poor quality workmanship. Contractors should be forced to apply for way-leaves and any damages to the reticulation network should be repaired within 24 hours or penalties should be imposed

On a similar basis the water department of the municipality has to monitor retrofitting programmes taking place in the communities to ensure that the correct work is being undertaken and that the required quality of work is being maintained.

The Municipality to Demonstrate Correct Procedures

It is important for the municipality to set the standards for being aware of the impact of water losses. In this regard:

- The municipality should monitor its own water losses or wastage and should ensure that leaks in and around municipal buildings are speedily repaired.
- Audits should be conducted at abandoned buildings and residential properties to ensure that the water supply to these properties has been terminated. These sites are often used by car washes as supply points.

Valve and Meter Audits

Valve audits should be undertaken on a regular basis throughout the network. This ensures that the settings of the valves are correct, that the valve location is known and is clearly visible and that the valve is in an operating condition. Similarly with meters which should be checked regularly both physically and by comparing monthly readings.

Metering and Billing

Metering, billing and enforcement of payment for all water supplied above the free basic service volume is the primary long term solution for controlling water wastage and misuse. Every house should have its own metered supply point. On this project there were ownership issues where informal houses had been erected on large, previously agricultural, plots. Such properties have to be formalised as nobody takes ownership of the water demand on these stands which often result in major water losses.

Summary

This pioneering project has developed a mechanism to enable a development partnership between the public and private sector to create mutual benefits to all involved parties. In essence, the significance of the programme lies in its prospect to impact water use within a series of multi-layered, but integrated, levels, i.e.:

- At a local level - to assist a municipality to initiate actions to reduce its water losses and overall water consumption resulting in the cost savings being available to implement further water conservation and demand management interventions;
- At a regional level - to allow a private sector water user to provide support and funding to water demand reduction measures that will be in its own long term interest while also providing assistance to the communities within its area of operation;
- At a catchment level – to reduce the demand on the Water Board and its demand on the catchment resource;

- At a national level – to contribute to the overall need of the country to reduce water losses and to protect the natural resource of the area to ensure long term sustainability;
- At an international level – to reduce the stress on transboundary river systems for the benefit of all countries dependent on this system as well as setting an example for possible replication in other areas of the system or in other river basins.

This development partnership demonstrates how a public-private sector cooperation model can be established to incentivise and leverage private investment for public water infrastructure and for building the capacity of municipal service providers. This aims at reducing urban water demand and shared water risks. It also demonstrates how a performance based contract can leverage the expertise of the appointed consultant or contractor to optimize the project benefits in return for a share in these benefits.

The success of the model applied at Emfuleni will hopefully inform participants in other similar partnership projects going forward.

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