

**Implementation of Guidelines on Water Conservation in Pilot Project for
uMngeni Municipality, Mpophomeni**

**Advisor’s Conclusions on the Implementation and Results of the Project and
Comments on the Service Provider’s Final Report (WRP/DMM April 2004)**

28.08.04

CONCLUSIONS OF THE IMPLEMENTATION AND RESULTS OF THE PROJECT

Overview:

Of the 11 outputs envisaged at the start of the project:

3 were achieved

3 were achieved in part

3 were not achieved during the period of the project

2 are unclear from the report, but probably achieved in part

The project was undertaken with considerable thoroughness and professionalism by the service provider, who demonstrated a willingness to adapt the workplan to suit the situation as found, and to find ways around the technical and administrative problems which were encountered. The service provider took on additional tasks related to the procurement of minor works, which were originally envisaged as being the responsibility of the municipality. However there are some shortfalls in the analysis of results and there are no specific recommendations for revisions / enhancements of the guidelines, apart from what can be gleaned from reading the report.

The active participation of the ward councillors in the project was a very positive feature of the project and contributed to the achievement of a good degree of community involvement.

The municipality technical services department struggled to deliver on its participation. There was a gain in human resource capacity, as a result of the project, but not as much as potentially could have been realised.

Project Objectives:

The Terms of Reference (ToR) for this pilot project, undertaken as Work Package 3 (WP3) of Output 8 of the IWRM project, defined two objectives of the Mpophomeni pilot project:

1. To test the water conservation and water demand management (WC/WDM) guidelines which had been prepared under a the first phase of the IWRM project (WP1), as a contribution towards the national project objectives
and
2. To implement as a trial, part of the WC/WDM business plan for uMngeni Municipality, which had been prepared under the second phase of the IWRM project (WP2), so as to learn from that experience before proceeding with implementation of the business plan for the municipality as a whole.

The first objective was met in part. The guideline procedure was not followed in all respects, however, and the report does not include a section on suggestions for revisions to the guidelines, as requested in the ToR.

The second objective was met in that many practical issues, and technical and administrative problems which had to be overcome, were highlighted by the project.

However the report does not include any comments on whether, in the light of the experience of the pilot project, consideration needs to be given to revising the original business plan, such as the scope of the measures proposed, or reviewing the justification for or prioritisation of any specific measures recommended in the business plan.

Project Outputs:

The results of the project according to the 11 outputs, which were listed in section 3 of the ToR, together with some key comments, are summarised in the table below.

Output as ToR	Result
<p>1. The introduction of the project to the community and ongoing liaison through appropriate community organisations and representatives.</p>	<p><u>Achieved.</u> Through a project steering committee, which included local ward councillors, the project was successfully introduced and the community was kept well informed throughout the project.</p>
<p>2 The up-dating of background maps and records of the water mains and ancillaries for the whole Mpophomeni supply area and the population of a Geographic Information System (GIS) with the information.</p>	<p><u>Achieved.</u> Starting from a very poor base, this output was achieved through a rigorous checking process, including a valve audit in which all valves and hydrants were checked physically on site. <i>Key Comment: The GIS is held within the municipality on a PC provided through the project. It is vital that GIS maintenance is being undertaken, i.e updating when new mains are added to the network and recording the positions of repairs, including a check on the asset details in the GIS at the repair location.</i></p>
<p>3 The establishment of a consumer meter database and the initiation of a consumer meter management programme in representative trial areas.</p>	<p><u>Achieved in part.</u> The existing combined consumer register and meter data database was inadequate in its basic content and had an unacceptably high level of error. A new consumer meter database was prepared and populated, but it is not clear whether this has been handed over to the municipality and is now in use and is being routinely updated. 140 meters were replaced in the pilot area, but the financial basis for meter renewal was not explored and the report does not include recommendations for a consumer meter management programme. <i>Key Comment: The project basically dealt with this output as a one-off exercise in which 128 out of 590 meters in the trial areas were replaced. The project should have provided the municipality with specific recommendations for an annual meter renewal programme based on the results of the testing and profiling of the meters, age, type and financial criteria.</i></p>
<p>4 The fitment of permanent data loggers to existing system meters (on reservoir outlets) and telemetry links.</p>	<p><u>Unclear.</u> The report indicates that loggers were fitted to the two meters for a period during the study, but it is not clear whether they were left permanently in place. There is no reference in the report to telemetry so presumably this was not fitted. <i>Key Comment: Permanent data loggers and a telemetry link to the water department office are strongly recommended. The information management technician should check the readings at least once per week to initiate corrective action if leakage appears to have increased.</i></p>

<p>5 The sectorisation of the existing reticulation network into two large leakage control zones.</p>	<p><u>Unclear.</u></p> <p>After completion of the records of water mains and valve audit, a new combined sectorisation and pressure management plan was devised which had 7 smaller zones. It is not clear from the report which of these zones have actually been installed.</p>
<p>6 The establishment of a pressure management regime in one of the zones.</p>	<p><u>Achieved.</u> (refer addendum report)</p> <p>A pressure management regime was established in one of the smaller zones, denoted as MC, and significant water savings were realised.</p> <p><i>Key Comment: It is a matter of concern that this is a new housing area where there should have been no leakage in new infrastructure</i></p>
<p>7 The establishment of an active leakage control regime in the other zone.</p>	<p><u>Not achieved during pilot project period.</u></p> <p>During the pilot project, night flow analyses and some step tests were done to estimate the amount of leakage and to localise the leak sources. However the final stage of leak location and repair was not undertaken by the municipality. It is understood from DWAF RO that these repairs may have been made since the date of the report.</p> <p><i>Key Comment: The objective of active leakage control is to minimise the time between a new leak occurring and its repair. The value of the saveable leakage estimated in 4.2.1 of the Technical Report amounted to over R60,000 per month, which should have been sufficient incentive to respond more quickly.</i></p>
<p>8 The establishment of passive leakage control for the whole supply area.</p>	<p><u>Not achieved during pilot project period</u></p> <p>The Technical Report records that, on average, it was taking 4 months to repair a leak after it was reported. An acceptable response time for passive leakage control is no more than 7 days. The municipality did not appoint the contractor to repair the leaks as envisaged in the TR, but instead relied upon their in house plumbers.</p> <p><i>Key Comment: Based on the average leak size given in the report, a 4 month delay represented a financial loss of some R10,000 per leak. This is a clear case of needing to outsource the task if the municipality’s own resources are over-stretched.</i></p>
<p>9 The introduction of measures to reduce consumer water use in the trial areas, including recommendations for retrofitting.</p>	<p><u>Limited achievement</u></p> <p>A reasonable successful public awareness campaign was undertaken, but the water saving gains were small. Part of the reason for this seems to have been the lack of understanding of the free basic water scheme.</p> <p>There was insufficient analysis of water consumption in the report and no recommendations were made with regard to the potential for retrofitting low use appliances.</p>
<p>10 Development of a system performance report form and initiation of its use.</p>	<p><u>Not achieved</u></p> <p>The service provider did not appear to understand what was required, even though the Advisor provided an example.</p>
<p>11 Contribution to capacity building for uMM personnel.</p>	<p><u>Achieved in part</u></p> <p>The bulk of the capacity building was achieved through one individual, a trainee seconded to the project. The municipality’s senior water services technician was trained in only one aspect of the project.</p>

COMMENTS ON THE REPORT (2 volumes)

General

The service provider only partially followed the format of the report which had been agreed at the inception stage. Whilst that would not matter so much if the submitted format substantially included all of the intended content, there are some omissions of reasonable significance, such as the absence of a section on feedback to the guidelines. Since the guideline was not always followed, it would have been particularly useful to have the service provider’s comments.

Volume 1 Project Report (titled study report)

In section 3 Pilot Project, not all of the 11 outputs in the ToR are included (refer Table above in this note).

In 3.10.1, the statement that the information given in Technical Report makes the system performance report redundant is wrong. The purpose of the system performance report is to provide a format for annual reporting, tailored to suit the supply area in question. The Advisor provided an example of such a report from another project to the service provider.

In the Summary and Conclusions, it would have been beneficial to include the financial impact of the real losses, as well as the apparent losses.

Other comments on the Project Report are included in the table of outputs above in this note.

Volume 2 Technical Report

1.1 Background

In para 4 it is stated that the business plan was accepted by both the municipality and DWAF. The Advisor gave comments on the business plan to the service provider, who agreed to take them into account in a re-issue. The Advisor has not had sight of the revised business plan, if it was in fact produced. One of the issues which was to be addressed was the need for the financial benefits of each of the proposed water loss reduction measures to be estimated, thereby providing a major part of the justification for the measures and as an aid to prioritisation.

Arguably, if this had been done, the linkage between delays in leak repairs and money would have been embedded in the municipality’s awareness base and faster action might have resulted.

[The question to ask of the municipal manager / director of technical services – if it was your house and your bills, do you wait for the municipal plumber to come round at some time in the future, time uncertain, or do you go out and get a private plumber to do it right away?]

3.2 Network Details

By attempting to put all of the pipe profiles in the one table, Table 3.2, clarity has been compromised. It would be better to have separate tables (even better histogram charts) for each of: diameter, material, age. There appears to be nothing between 5 and 30 years of age.

3.5 Sectorisation Details

It is not clear from the description what the current status is, i.e what zones have been created under the project, and which are still to be implemented.

3.6 Pressure reducing valve details

It is a matter for serious concern that brand new infrastructure is exhibiting the amount of leakage identified by the project. **The municipality or other responsible authority must take urgent corrective action.**

3.7 & 4.1 Consumer metering

In terms of the various appraisals and tests, this work was thoroughly executed, but best use of the data was not made. A significant omission is details / recommendations for an ongoing meter renewal programme, based on the findings of the project, so that the municipality can plan and budget for this activity.

Although it is stated in the text that the distribution of meter accuracies seems to follow the age profiles, there is not a graph which shows this. Another factor of interest in this case is whether is the type / manufacturer has a bearing on accuracy – there are two major and two minor suppliers. Was the accuracy profile the same for the Kent and the Premier? If not then the meter renewal programme should take this into account.

The decision to replace meters based on a single factor of 2.5% accuracy was not optimised on a financial payback basis, especially having regard to the rising block tariff and free basic water for the first 6kl per month. The guideline indicates that as well as age, the consumption / earnings of a meter should be taken into account.

A domestic meter recording, say, 15 kl/ month or 180 kl/year “earns” R900 per year at an average water price of R5/kl (for this example ignoring fbw). If it is 2.5% inaccurate (under recording) it is losing only R22.50 per year, compared with the average cost of replacement of R1,118 (Table 7.9), and cannot be justified for replacement on a financial basis. On the other hand, if a meter on large commercial premises was earning R100,000 per year, say, and was 2.5% under recording, it would be losing R2,500 per year. The financial consequences and meter replacement decision is quite different.

Whilst it is appreciated that in Mpophomeni there are no large users, the basic principles could have been set out and a simple methodology developed for the municipality to use elsewhere. The question also remains - what is the recommended meter management programme for Mphomeni, what criteria are to be used and how should it be implemented?

4.2 Active leakage control

This section precedes the mass balance water audit in the report and starts with presentation of night flow and leakage estimates, it would have been clearer if the water audits presented in section 5 had been presented first and brought together with the night flow and leakage analyses. There appears to be a large anomaly in the real loss figures. From Tables 4.8, 4.9 and 5.4, total physical losses in November 2003 = 701-97 = 604 MI/yr, but from Table 5.6, total real distribution losses are only 293 MI/yr. One error was to assume that leakage in the day would be the same as at night and a correction factor should have been applied to the hourly night flow figure and not multiplied by 24 x 365, but it does not account for the whole difference.

The estimation of leakage losses is carried out using BABE, which is not unacceptable, but DWAF have standardised on infrastructure leakage index (ILI) as an indicator, as set out in the guidelines. Using BABE is a useful cross check and an interesting discussion point, but an ILI based target should also have been derived (as guideline Vol 3 section 5.4. of March 2003 issue).

Use of different terminology and definitions in water losses has hampered meaningful comparisons for many years and it was one of the objectives of the guidelines to establish a common basis for South Africa. The report uses the term “unexplained (and unaccounted for) leakage” which is not in the guideline and is in any case misleading since it really means “the sum of leaks which exceed a standard background estimate level”. Neither background leakage nor any other leakage above that should be referred to as “unexplained”.

The report uses certain default loss parameters in Table 4.3. Where do these come from? Is it recommended that these should be included in the guidelines?

In Tables 4.10 and 5.6, it would have had greater impact to include the monetary value of the “unaccounted for leakage” (actually the target reduction for ALC). At R2.5/kl purchase cost from the water board, if correctly quantified (see above) these 20 esbs alone are costing the municipality about R760,000 per year. The total real losses in Table 5.6 represent R733,000 at R2.5/kl water purchase price.

4.3 Passive leakage control

The intended introduction of passive leakage control does not seem to have been implemented. It is not stated why. [A passive leakage control programme is judged by the response time to reports of visible leaks – 7 days is a not unreasonable target].

The report basically comprises an evaluation of the existing arrangements, which was very useful, and illustrated the effect of not having a passive leakage control programme. But it would have had much more impact if, like the active leakage control, the effect of the very delayed response to dealing with reported leaks had been quantified in monetary terms.

If we assume that an average leak is the esb value of 1.8 m³/hr night flow (say 32 m³/day allowing for diurnal pressure variation), then for water purchased at R2.5 per kl, a delay of 4 months between report and fix is costing the municipality an average of nearly R10,000 per leak, compared with an average cost to repair the leak of less than R300 (Table 7.8, but must add the cost of finding the leak, say R1,000 to be safe). Was this pointed out to the municipality? Presumably not, otherwise they would not have decided against appointing an external contractor as reported.

5.1 Consumption analysis

This important section is really too brief.

There is no attempt to explain the wide variances in household consumption shown in Fig 5.1. Are the lower / mid / higher ranges related to different categories of housing? Are the top 10% which are more than 3 times the average using water for irrigation? How does the consumption vary seasonally? Only by understanding why these variances exist can an effective water use reduction programme be devised.

For the purposes of testing the guidelines there should have been a comparison with Table 6A in Volume 2.

The ToR requested recommendations for retrofitting, if appropriate. This is not discussed.

In the comment on Tables 5.1 and 5.2, the report refers to a 3% increase in consumers falling into the 100% free basic water category. It is arguable whether this is statistically significant, but equally worth pointing out is the fact that there was a 9% reduction in the > 30 kl/month consumption category, which is more likely to be statistically significant.

6 Consumer attitudes

This appears to have been a valuable exercise and demonstrated the positive impact of the awareness campaign.

7 Resource deployment and costs

The information in this section is most useful and, together with corresponding information from the Cederberg pilot should be reviewed for incorporation in the guidelines (annex).

Did any of the activities cost considerably more or less than the estimates made in the business plan (WP2)? If so this should be mentioned and the justification / extent of that business plan component reviewed.

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