

**Implementation of Guidelines on Water Conservation in Pilot Project for  
Cederberg Municipality**

**Advisor's Conclusions on the Implementation and Results of the Project  
and  
Comments on the Service Provider's Final Reports (Tlou & Matji, March and  
April 2004)**

19.09.04

**CONCLUSIONS OF THE IMPLEMENTATION AND RESULTS OF THE PROJECT**

**Overview:**

The project has been judged by all parties to be successful. Led by Carl Bro's service provider, the project was undertaken with commitment and enthusiasm by a team of personnel from the service provider, Cederberg municipality, and the Olifants Champions.

Of the 12 outputs envisaged at the start of the project:

7 were achieved

4 were achieved in part or are unclear from the report, but probably achieved in part

1 was not achieved

This was a creditable result. The one output, which was not achieved, could have been delivered with only a little extra work, since it is essentially a desk exercise.

The project underlined the need in this kind of work:

- (a) To adopt a close team working arrangement between a water undertaking and its technical services provider, rather than the traditional employer / consultant relationship with which the parties are familiar in developing capital investment schemes
- (b) To include essential improvements to the level and quality of information on the infrastructure and its operating parameters, and in the information systems which generate that information

**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 Cederberg 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 Cederberg 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 for the most part, although there was some departure from the guidelines (refer later comments).

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

**Project Outputs:**

The results of the project according to the 12 outputs which were listed in section 3 of the ToR, together with some key comments, are summarised in the table below.

PR = Project Report TR = Technical Report

Output as ToR	Result
<p>1. The introduction of the project to the communities and ongoing liaison through appropriate community organisations and representatives.</p>	<p><u>Unclear.</u></p> <p>The only reference to this task appears to be in the PR Annex A, Progress Summary, which records that the project was introduced to the municipality’s councillors and that there was a presentation at a Reference Group meeting.</p> <p>In Clanwilliam there was a consumer use reduction campaign (Output 10), so the community in that town would certainly have been aware of the project. It is not reported how the task was undertaken in the other two towns.</p>
<p>2 The up-dating of background maps and records of the water mains and ancillaries for Clanwilliam town and the population of a Geographic Information System (GIS) with the information.</p>	<p><u>Achieved.</u></p> <p>This output was achieved to a high standard, including aerial photographic overlays.</p> <p><i><u>Key Comment 1:</u> 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 and their correction as necessary. As is seen in Output 6, despite the efforts made to create the GIS with the best information available at the time, anomalies still remain.</i></p> <p><i><u>Key Comment 2:</u></i></p> <p><i>In common with the corresponding project in M-U WMA, the project showed up the poor quality of the billing database, as a consequence of its creation and management primarily for accounting purposes, without technical input or quality control. The recommendation in the guideline that the maintenance of such a database, which needs to be used by both technical and financial depts., should be a technical services and not a treasury function is justified and recommended for Cederberg Municipality.</i></p>
<p>3 The checking of key hydraulic details of the primary components of the water supply infrastructure in Clanwilliam and the production of a schematic diagram.</p>	<p><u>Achieved.</u></p> <p>This output was achieved as far as the original ToR is concerned, but with little effort could have been enhanced to the full extent requested by the Adviser (and now shown in the latest version of the guidelines). See comment on Technical Report.</p>
<p>4 The installation of new / replacement primary system meters in Clanwilliam, Citrusdal and Elands Bay.</p>	<p><u>Achieved in part / unclear.</u></p> <p>According to Table 5 of the PR, meters were installed in Clanwilliam and Citrusdal, but in 5.3 of the TR, there is only reference to Clanwilliam. If the original proposal for primary system metering in Elands Bay was not carried out, it is not clear why.</p>

<p>5 The establishment of a consumer meter database and the initiation of a consumer meter management programme in Lamberts Bay.</p>	<p><u>Achieved.</u></p> <p>The existing billing database had no information at all on the consumer meters and this major deficiency was rectified by the project survey.</p> <p>The survey also revealed the fact that 47% of consumers either had no meter or that the meter was buried. In both situations there was no proper measurement of consumption, rendering the original flow balance meaningless.</p> <p>New meters were installed within the project and recommendations based upon the findings of the survey and sample testing of meters were made.</p>
<p>6 The construction of a validated all mains hydraulic model of the water supply an reticulation network of Clanwilliam and the use of the model in designing leakage control zones and a pressure management regime.</p>	<p><u>Achieved.</u></p> <p>Considerable effort went into this task and the difficulty which was experienced in achieving good correlation between model and field results was a further demonstration of the poor quality of information that was available at the start.</p> <p>Even after calibration adjustments, the final level of validation of the model was outside of international norms, but this can be understood in a South African context where water reticulation management is in its infancy.</p> <p><i>Key Comment:</i></p> <p><i>Within the IWRM Output 8 staff and budget plan, it was not possible to assign a Carl Bro specialist in water network modelling to work with and advise the local service provider.</i></p> <p><i>DWAF should give consideration to funding a demonstration programme of water network modelling, to introduce international practice and methodologies in this field.</i></p>
<p>7 The sectorisation of the existing reticulation network, valve checking and installation of district (leakage control zone) meters in Clanwilliam, Citrusdal and Elands Bay.</p>	<p><u>Achieved in part.</u></p> <p>Sectorisation was not fully completed within the project, since not all of the boundary valve replacement / repairs were carried out.</p>
<p>8 The establishment of a pressure management regime in Clanwilliam.</p>	<p><u>Achieved.</u></p> <p>A pressure management regime was established and significant water savings were realised.</p> <p><i>Key Comment: It necessary for the PRV to be checked and maintained regularly to maintain the leakage reduction savings which were realised during the project. There appears to be scope for further pressure reduction and savings, once consumers become used to the present level of pressure.</i></p>
<p>9 The establishment of an active leakage control regime in Citrusdal and Elands Bay.</p>	<p><u>Achieved in part / unclear.</u></p> <p>The PR Table 5 states that leaks were identified and repaired in both towns, but only in the Exec Summary does the TR refer to Elands Bay (Advisor is aware that leaks were in fact detected and repaired in Elands Bay). There is a chapter (10) on active leakage control in Clanwilliam, but this basically deals with recommendations for the future and does not describe the activities and results of the project.</p>

<p>10 The introduction of measures to reduce consumer water use in Clanwilliam.</p>	<p><u>Achieved</u></p> <p>A successful public awareness campaign was undertaken, although the results were masked by the drought conditions which forced consumers to reduce consumption temporarily.</p> <p>However the report makes no mention of the work carried out by the Olifants Champions, which was a core component of this output. In fact their work exceeded the scope of the original ToR in that household leak repairs were also undertaken.</p>
<p>11 The development of a system performance report form and initiation of its use.</p>	<p><u>Not achieved</u></p> <p><u>Key Comment.</u></p> <p><i>The Advisor has advocated that water undertakings should develop annual system performance reports (basically a set of tables with key data on current and last 5 years), so that senior managers can effectively monitor and manage their infrastructure and water demand control efforts.</i></p>
<p>12 Contribution to capacity building for CM personnel.</p>	<p><u>Achieved</u></p> <p>Several municipality personnel took an active part in the project, although the municipality did not appoint the information management technician which was recommended by the Advisor before the start of the project.</p> <p><u>Key Comment.</u></p> <p><i>Reliable, up to date data on the infrastructure and its operating parameters (flows, pressures, failures) is an essential component of active system and demand management. This task for all 5 Cederberg towns can support a full time technician post (which will be self financing) and is again strongly recommended by the Advisor.</i></p>

**COMMENTS ON THE REPORT (2 volumes)**

**Volume 1 Project Report**

*Section 3.4 Outputs – Summary of Results*

This section is incomplete. Table 5 should have included all of the ToR outputs, as the advisor’s example above.

It is not possible by reading the report to get a sense of the scope of the project in physical terms, e.g.:

- lengths of reticulation main and nos of connections checked, entered into GIS and hydraulically modelled
- numbers of new / replacement system meters installed
- ditto consumer meters
- valves checked, repaired replaced, lengths of main laid for sectorisation
- numbers of leaks detected and repaired
- estimation of water savings and financial impact
- reduction in numbers of bursts achieved through pressure reduction
- consumer leak repairs

### *Section 4.3 Lessons Learned*

It is a sweeping statement and not really justified to say that the WC/WDM guidelines are generic. There is some generic content, but many of the guidelines are specific and set out a step by step procedure to be followed.

The guidelines on asset records have been updated with the points mentioned, but it should be emphasised that, however important they are for WC/WDM, these subjects are equally important for other aspects of efficient and cost-effective asset management and service delivery. It was never the purpose of the guidelines to be a manual of good practice for municipal water services.

With regard to the Business Plan, it would be more correct to say that the pilot project confirmed the soundness of the main features of the Business Plan and that a good start had been made to meeting the objectives.

## **Volume 2 Technical Report**

### *General*

The report contains a considerable amount of information and detail, and goes beyond what was asked for in the Terms of Reference. This is acknowledged and appreciated.

### *Glossary of Terms*

Rather selective, sewers and sewerage seem unnecessary, whereas terms like “active leakage control” are worthy of explaining.

### *Executive Summary*

Third bullet point in second set. Active leakage control programme should start with zone with highest Infrastructure Leakage Index (ILI), not highest minimum night flow.

The consumer awareness campaign and the work of the Olifants Champions in household leak repairs etc. should have been mentioned.

### *3 GIS and Structural Model*

The considerable effort which went into this exercise, and the fact that there is some way still to go, comes across clearly in the report.

### *6.4 Analysis of Flow Logging Results*

In 6.4.1 it states that proprietary software was used, so the calculations are therefore hidden. The basic calculations can be done from the guidelines and it would have been better, given one of the objectives of the project, if this had been done.

A key feature of the guideline is the use of the leakage performance indicator “Infrastructure Leakage Index”. This should have been calculated for the three areas and for each monitored zone.

In Table 6.8 the very large difference in Citrusdal and Elands Bay between the leakage estimates using night flow and mass balance methods means that there is something fundamentally wrong with the data. No further significant effort should go into leakage management until this has been resolved.

Also in Table 6.8, the allowance for apparent losses of 5% is much less than the results of the consumer meter testing in Lamberts Bay at 28%.

### *7 Hydraulic Modelling.*

Table 7.2. It would have been useful to have presented here the seasonal variation in demand, since this is significant and of interest. There should be both an average day and a peak day model.

It is mathematically / statistically wrong to summate average consumption per erf and then express each category as a percentage of this sum, which is a meaningless number. To derive the percentages of total usage one needs to use the total consumption per category in kl/month, not the average consumption per erf.

The calibration of the model was a very beneficial exercise but the finished model still had a level of variance from the measured flows and pressures which fell significantly outside of the target level. It would have been helpful to have had an experienced Carl Bro modelling specialist to assist the service provider, but this was not possible within the framework of the project.

### *9 Pressure Management*

As promoted in the guidelines, pressure reduction proved to be a very cost effective means of leakage and demand reduction. It also achieved the specific objective for Clanwilliam of reducing the frequency of pipe bursts.

Vol 2 of the guideline, section 5.4.3, has a formula and table giving the predicted leakage savings with pressure reduction. It would have been most useful to have compared the actual results with the guideline formula, but this was not done. It does not seem possible to make the comparison using the Tables 6.4, 9.1 and 9.4, due to differences in zoning sub-division.

### *10 Active Leakage Control*

This chapter deals only with Clanwilliam, which is intended to be subject to ALC as a next stage following the sectorisation and pressure reduction. No details are given of the activities in Citrusdal and Elands Bay which were within the project, although they are mentioned in the summary and conclusions.

### *11 Consumer Metering, Lamberts Bay*

This work was thoroughly executed and revealed the very poor state both of the meter stock and the information database. Although this section of the report covers several pages, some data and analyses appear to be missing. Was the number of meters replaced the same as the number tested (145)? In 11.6 the text refers to over and under registration but Table 11.4 only provides a summary. It would have been interesting to compare the results with those from the other pilot where a statistical distribution of over and under registration was plotted. Was there a correlation between age and inaccuracy? Were there any differences between the accuracy of the different makes of meter?

The basic recommendations for the meter renewal programme are based on sound principles, but it would have been useful to have shown the financial context on a payback basis for the low, middle and high consumption ranges.

### *12 KAP Survey*

Only the results of the “before” survey are reported, which is given in detail over several pages. The results of the “after” survey are limited to a short statement in section 13.3.

### *13 Consumer Awareness Campaign*

The report has a major omission in not making any reference or review of the work of the Olifants Champions in this task. At the very least their report should have been included in an Appendix.

The Champions undertook household leak repairs which were not in the original ToR. This was a significant “added value” component – 198 no. in total, plus 43 leaking meters reported to the municipality for their action. It would have been of interest to have seen if the minimum night flow was lowered in the high density housing area as a result.

***Hugh Allan***

DWAF/Danida IWRM Project WC/WDM Advisor