The Use of Key Performance Indicators in the Benchmarking of Rural Water Supply Schemes: An Aid to the Development of Meaningful Local Government Capacity

David Still and Faye Balfour

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Water Research Commission

THE USE OF KEY PERFORMANCE INDICATORS IN THE BENCHMARKING OF RURAL WATER SUPPLY SCHEMES: AN AID TO THE DEVELOPMENT OF MEANINGFUL LOCAL GOVERNMENT CAPACITY

Report to the
WATER RESEARCH COMMISSION

by

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on behalf of

Partners in Development cc

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EXECUTIVE SUMMARY

> As the cock said to the hens when he showed them the ostrich egg, I am not disparaging, I am not criticizing. I am merely drawing your attention to what is being done elsewhere!
>
> *Source unknown*

In November 2000 The Mvula Trust produced, on behalf of the Department of Water Affairs and Forestry, a publication entitled "Developing Community-based monitoring and Evaluation Tools for Rural Water and Sanitation Projects". This study contains very useful, practical methods for field management of rural water projects (some of which have been reproduced in Appendix E to this report). However, perhaps the most useful insight provided by the report is conveyed in the following quotation:

The water committee felt that the tools were important aids with which to identify issues or problems that needed to be followed up. For example, they discovered that the bookkeeper had stopped completing records, due to the fact that the committee was not looking at the books.

That aptly illustrates the saying, *people don't do what you expect, they do what you inspect*. But if you are going to inspect, then what do you inspect, how do you inspect, and how do you report on your inspection? If the inspection system is too onerous or burdensome, it will be ignored, or the inspectors will tend to return spurious information. If the system is too superficial, the results will be meaningless.

In the course of this study a number of monitoring initiatives taking place around South Africa have been reviewed. Some are very ambitious, and some are quite basic. Various programmes within the Department of Water Affairs and Forestry have sponsored the development of different systems, but the only one which is used by DWAF is their M&E system (Version 4.4). This system can tell the inquirer whether a water system has been planned, or built, but it cannot tell one whether the system is functional or sustainable.

The management of the operation and maintenance of water systems is the function of local government, and over much of South Africa local government is only now starting to feel its way into that new responsibility. Staff have been hired, capacity is being built, and funds are being made available. Water Services Managers must now start to monitor the Key Performance Indices on their water systems, so that they know whether they are working reliably and delivering the right quantity and quality of water.

A number of studies have been undertaken, and are being undertaken, in South Africa regarding key performance indicators and benchmarks. Many of these relate either to large water utilities (supplying urban areas), or to the activities of higher level organisations such as Water Services Authorities. Two which relate to community water supply in particular are:

- The Council for Geoscience's Sustainability Indexing Tool (SusIT)
- The Alfred Nzo District Municipality's (ANDM) community water supply programme

The District Information Management System (DIMS), which was piloted by the uThungulu District Municipality, is potentially very useful because it is internet based and thus allows easy production of reports comparing data over whole districts, or over time.

In terms of actual KPI recording and benchmarking on the ground, however, the Alfred Nzo District Municipality's reporting system is the only one which has to date operated continuously in a real management situation at any significant scale. The system features multi-level reporting which provides an efficient system for senior management to track progress on schemes without overburdening them.

At community level, systems of KPI recording are needed which are simple, practical and effective. In the course of this research a method of KPI recording at community level using standard data sheets and standard charts was tested. These sheets and charts are filled in by hand, which means that it is not essential to have computer facilities to do basic management. It was found that community level administrators could understand and work with this system, although only the simpler KPIs were tried out. With a longer term management commitment, there is no reason why more complex KPIs could not be tackled.

The KPIs that were successfully tested (income, expenditure, water losses, number of taps, energy bill etc) were found to be useful in understanding trends in the water schemes being managed.

A set of basic yet fundamental benchmarks for rural water supply in South Africa was investigated, including the following:

- Capital cost per person served
- Capital cost per waterpoint (standpipe) provided
- Number of people served per standpipe
- Length of pipe laid per family
- Cost of operation and maintenance per person served

It was found that, in 2004 rands, the typical rural water project costs approximately R8 000 per family to build, although this varies considerably across three provinces surveyed (KwaZulu-Natal, Limpopo and Eastern Cape), and between projects within the provinces. Water supply is most expensive in KZN, and least expensive in the Eastern Cape. The reasons for the difference can be explained by differences in topography and settlement patterns. Depending on the real size of our water supply backlog, South Africa will need to spend somewhere between 7 and 24 billion rands before all have water. When the capital cost of water projects is divided by the number of public standpipes, it is found that typically between R75 000 and R185 000 is spent for every water point. When one considers that the typical cost of a handpump is usually somewhere between R30 000 and R50 000, it is clear that a considerable premium is being paid for piped water.

While some instances were found where taps were expected to serve unrealistically large numbers of families, on typical projects there is a tap for every 7 to 12 homes (the lower figure being for KZN with its more spread out settlements, and the higher for the Eastern Cape).

No major difference was found in the length of piping used on typical projects across three provinces, but the variability was much higher in KZN than in Limpopo and the Eastern Cape. The median figure was 40 metres per family, with the range of the middle 50 percentile from 20 to 70 metres.

Operation and maintenance costs are typically in the range of R3 to R6 per person per month, although this does not take asset replacement into account.

The importance of community based management has decreased over the period during which this research has been undertaken. With the implementation of the Water Services Act (No. 108 of 1997), most municipalities are taking a direct hand in the operation and maintenance of their newly acquired water infrastructure. This is not a bad thing, in so far as municipalities are far better resourced than struggling rural communities. However, there are significant economies which are achieved when a rural community does manage to successfully operate and maintain its own scheme, as is illustrated by the example of Nhlungwane in Figure 10 on page 50.

Regardless of who manages a water scheme, without the recording of key performance indicators over time, it is not possible to manage a water project effectively. At the very least these indicators should include the following:

- Reliability of service
- Quality of water supply
- Number of taps working

Ideally the indicators should also include items such as:

- Level of Unaccounted for Water
- Water consumption per person served
- Energy usage
- Water level in borehole or dam (where relevant)
- Staff costs
- Other costs
- Income (where relevant)
- Operating cost per unit of water supplied
- Operating cost per family served
- Average time taken to respond to fault reports
- Average time taken to make new connections
- Adequacy of stock on hand.

In order to convey the meaning of KPIs, they should be displayed graphically over time. By so doing, trends can be observed, and it can be deduced whether the scheme being observed is stable, getting worse or getting better. Even at the community level administrators should be taught how to record and plot simple but vital KPIs.

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1. INTRODUCTION

1.1 Reasons for this study

Over the last two decades, a great deal has been said and written about the ideal of community based management of rural water supply projects. While it is generally accepted that a high level of community management offers the best hope of rural water supplies being able to operate economically, it is also generally believed that most stand alone rural projects deliver a poor service (in terms of reliability and quality). Moreover the committees who run these projects tend to be unaccountable, either to their community, or to the relevant Water Services Authorities.

For a long time it has been believed that the solution to the management problem is training, and as a result very substantial sums of money have been spent by the Department of Water Affairs and Forestry on training community committees to manage their schemes effectively.[1] As projects have moved into the operational phase, however, it has been realised that training in itself does not ensure that projects will be properly managed. For example, at Nhlungwane, which is one of the better run community water projects in South Africa, the Mvula Trust found on one return visit that the book keeper had stopped keeping books because the committee never looked at them. The people who make up rural committees are like any other people any where - *regardless of how well they know what they should do*, *they do what you inspect, not what you expect*. The problem is that newly emergent local authorities (the responsible inspectors) still have very little idea of what questions to ask when visiting projects, nor how to ask them - i.e. the inspection needed to stimulate good management is not taking place on any effective level.

There are scores of different Performance Indicators that are encountered in government reporting systems. The problem is that these are typically too numerous and varied to help the harried council official who needs to know the answers to simple but critical questions like:

- what is it costing to supply one kilolitre on this project, and what is the trend in this cost?
- is this service provider going bankrupt?
- how reliable is this supply and is it getting better or worse?
- is this committee able to account for its income and expenditure, and is it doing so?
- how much water is being lost, and are losses getting better or worse?
- how much water is being consumed, and is it getting more or less?

In the authors' experience in studying rural water supply projects all over South Africa, very few water supply authorities can answer these questions with ease or with confidence, and yet all would agree that this should not be so. There is thus a need for simple but effective monitoring and benchmarking systems for rural water supply.

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[1] In the Department of Water Affairs and Forestry's January 2000 publication "Cost Benchmarks. Water Supply Development Projects: A Guide for Local Authorities" the range given for the cost of capacity building and training of communities is between 4% and 10% of project costs in the R10 million to R600 000 cost range.

The challenge is therefore to develop simple and effective reporting systems, easily understood by rural water committees, which they can be expected to use to report to their own communities, as well as to the relevant authorities. The set of KPIs must pictorially depict trends (good or bad) in strategic areas such as service performance, financial health and accountability. With such a system in place, monthly visits from municipal officials can become more effective occasions for communication, problem identification and problem solving.

1.2 Scope of study

The key performance indicators were to be tested in a number of different rural projects, and their effectiveness was then to be workshopped with the relevant water services authorities. During the course of the project the scope of work was redefined to include background material on key performance indicators and benchmarking in rural water supply in South Africa.

1.3 Objectives

The objectives of this project, as stated in the project proposal, were as follows:

i) To test a set of selected key performance indicators designed to enable emergent local government structures to manage rural water supply projects. The KPIs must be useful to both local government officials and to community water supply committees.

ii) To disseminate the lessons learned from the testing of these KPIs to the rural water supply sector in South Africa, to encourage good practice and to build the capacity of the sector to be able to fulfil its mission.

1.4 Structure of Report

Chapter 2 of this report describes the context of rural water supply in South Africa, including brief overviews of the roles of Water Services Providers, Water Services Authorities and Community Based Organisations. The implications of the Free Basic Water Policy are also briefly discussed.

Chapter 3 defines and describes Key Performance Indicators and Benchmarks, demonstrating the differences between the two. A number of KPI initiatives from recent practice in South Africa are described.

Chapter 4 discusses the methodology used to gather the information for the KPIs and benchmarking systems. A trial set of key performance indicators which are relevant to the operation of rural water supply schemes are divided into three types: those related to the service (quality, quantity etc); those related to finances (costs, cash balances, income, expenditure etc); and those related to accountability. A description of methods for collecting the relevant data in the field is provided, including data collection sheets for reliability of supply, for quality of supply and for financial records.

Chapter 5 details the findings of the research, showing the KPI results for the three projects and the benchmarking data from projects in three provinces. The latter gives examples from recent data of benchmarks in rural water supply, including inter alia capital cost per family served and per standpipe: numbers of families served per tap, length of piping per family served and the maximum kl per family per day as determined by scheme capacity.

Chapters 6 and 7 provide the conclusions and recommendations from the study.

2. BACKGROUND

2.1 An overview of rural water supply in South Africa

Access to potable water for all has been one of the political priorities of the government of South Africa since the advent of full democracy in 1994. Ten years ago the number of people estimated to be without such access was estimated at 12 million. By June 2004 the Minister of the Department of Water Affairs and Forestry was able to state that the government had in the decade since 1994 supplied water to ten million people who had previously not had a proper water supply. She moreover stated that the backlog was now 4.4 million people (the original estimate of 12 million to supply was now outdated due to population growth, and it might have been an underestimate to start with).

2.2 The Water Services Act (No. 108 of 1997)

The main objectives of the Water Services Act of 1997 were: to provide for the right of access to sufficient basic water supply and sanitation services; to set national standards for water services through required development plans, progress reports, and tariff standards; to provide a regulatory framework for water service institutions (including authorities and providers); and to establish the authority of the Minister of Water Affairs and Forestry in the water and sanitation sector (RSA, 1997).

The Act distinguishes between Water Service Authorities (WSAs) and Water Services Providers (WSPs) - the two key functions at local level. A WSA is the local government body (district or local municipality) responsible for ensuring access to water supply services and sanitation services. This includes the following duties: preparation and adoption of a water services development plan; annual reporting on the development plan; ensuring that WSPs are in place to operate and maintain water infrastructure (WSAs either create in-house WSP capacity, or they contract independent entities to provide this capacity); developing bylaws for the provision of water and sanitation services; and monitoring the performance of WSPs within the WSA's area of jurisdiction. A WSP is defined by the Act as any person/entity who provides water and sanitation to customers. A WSP is to be contracted for a limited period and subject to conditions, and must provide any information requested by the WSA, provincial government, the Minister, or any consumer (RSA, 1997). An important stipulation for WSPs is that "a water services authority may only enter into a contract with a private sector water service provider after it has considered all known public sector water services providers which are willing and able to perform the relevant functions" (RSA, 1997 19(2)).

One of the effects of the implementation of the Water Services Act, has been the decline in importance of the village water committee. In the 1990s rural schemes were, by and large, expected to be operated and maintained by village water committees, with limited external support. It was soon realised that continuous external support was required, and this needed to be provided within a local government framework that included all communities. This new dispensation was provided for in South Africa by the

establishment in the year 2000 of a coherent and universal system of local government (previously lacking in South Africa due to the fragmentation of government services caused by the apartheid system). The current situation (in rural areas) is that municipalities do own and are expected to operate and maintain all communal water supply infrastructure. The official role of the village water committee is now primarily one of facilitation and liaison with the municipality, as the current legislation does not provide for a community based organisation to be legally contracted as a water services provider. For this reason the focus of the monitoring of water services has in the last few years changed from the health of village water committees to the quality, reliability and cost efficiency of the service itself.

2.3 The monitoring of water supply services

A Water Service Authority is required by the Water Services Act of 1997 to monitor the performance of all water service providers within its jurisdiction, ensuring that the WSPs comply with national and local legislation and standards. In the case of a municipality which is itself both WSA and WSP (many have opted for this model), the two functions are required to be managed and accounted for separately, to allow for monitoring. The intention of the monitoring is to ensure that the people living in the WSA's area of jurisdiction do receive a reliable supply of water of an acceptable quality, and that the cost of this service is in accordance with national and local government policy. However, exactly how the WSA should go about this monitoring is left to the WSAs to decide.

2.4 The Free Basic Water Policy

The 1996 South African Constitution listed access to water in the Bill of Rights and the 1997 Water Services Act provided the legal basis to implement this right. In 2001, the government introduced the Free Basic Water policy, which is the legislated right for every South African household to have access to a "basic" supply of water at no cost. This is funded by using the grants from the national treasury (termed "Equitable Share"), and by using cross-subsidisation. To define a basic supply a guideline figure of 6 kl/household per month is used, which would equate to 25 litres per person per day for a typical rural household of eight persons, and 50 litres per person per day for a typical urban family of four persons. Some have criticised the 6 kl per household figure as being insufficient for basic needs (particularly in urban areas), and also for not allowing for cases where several families are served by one connection. However, in terms of the policy and guidelines Water Services Authorities are given considerable freedom to adapt the policy as they see fit, according to their means.

The Free Basic Water Policy was officially implemented from July 2001. This occurred on schedule in the larger urban areas without much difficulty, as an adjustment of tariffs to cross-subsidise those using less than the basic amount was all that was necessary. However, rural areas were much more difficult, due to the challenges of large distances, small volumes, high overheads and poor resources. Water Service Authorities (WSA) are still at varying levels of implementation of the policy, with few having a fully operational policy that is reaching all their rural schemes. Some rural communities have still not been officially informed about FBW and are still paying for all their water. Progress to date varies greatly

between municipalities, from full strategy-based implementation to random default implementation. It is notable that in March 2005 the Department of Water Affairs and Forestry's website keeping track of the roll out of Free Basic Water put the number of people in South Africa without access to infrastructure (and therefore without Free Basic Water) at 10.9 million. This is 6.5 million more than the number of people reported as unserved in August 2004. Whatever the reasons for the discrepancy (e.g. what is meant by "infrastructure", and what is meant by "access"?) it does illustrate the level of uncertainty with much reported data in water supply in South Africa. Better monitoring systems would help to close the uncertainty gap.

Where FBW has been implemented in rural areas, consumption has proven to be generally within the free allowance, and therefore there is no longer any income generated from these schemes. Thus, municipalities with a primarily rural constituency, and no large cities, are greatly reliant on the Equitable Share allocations from National Treasury to cover the costs of water provision.

3. KEY PERFORMANCE INDICATORS AND BENCHMARKS

The provision of water is vital to all communities. Water Service Authorities/Providers are often monopolistic and not subject to market competition, therefore, it is important that water provision is independently monitored to ensure that the performance of service providers is at an acceptable standard. In South Africa, the water service sector has significant financial constraints and it is thus imperative that supply is effective and efficient if it is to be sustainable (Pybus, 2002). Benchmarking is internationally regarded as an effective means of assessing and monitoring performance for inter-institutional comparison. This is formally supported in South Africa through the Water Services Act (No. 108 of 1997) which requires annual performance reporting to the Department of Water Affairs and Forestry (Schoeman and Magongoa, 2004).

3.1 Key Performance Indicators (KPIs) and Benchmarks as a management tool

Key Performance Indicators (KPIs) and Benchmarks are management tools for monitoring and improving the performance of people, systems, processes and organisations. Depending on the context, there may be some overlap in the definition between KPIs and Benchmarks. However, for the purposes of this study, Key Performance Indicators and Benchmarks are defined as follows:

Benchmark: A benchmark is a measurement describing a key aspect of an entity that is being studied. It is typically an aspect that changes little with time, if at all. For example *the length of water pipe per customer served* is a benchmark which will vary according to housing density and to level of service. The number of Water Service Provider staff per 1000 customers served would be an indicator of WSP efficiency, and so on. Benchmarks are useful for comparing the performance of entities at the same time.

KPI: A Key Performance Indicator, or KPI, is a measurement that describes how well an entity is meeting its objectives, or the health of an entity, and may vary significantly with time. For example, the *volume of water which cannot be accounted for* in a system is a measurement that can vary significantly with time, depending on the frequency and the seriousness of leaks, and the length of time it takes to deal with those leaks. The balance in the operating account would be another example of a time variable indicator.

Indicators that vary significantly with time cannot be interpreted meaningfully when viewed at and isolated point in time. Such indicators have to be monitored regularly in order for the trend in the indicator to be established. For example, a tap or set of taps might not be operational on the day of an inspection, and one might conclude that the whole system is “not working”. What one really needs to know is, how many taps of the total are not working, how long has this been the case, and how often does this occur? To answer these questions requires a system of continuous monitoring, much like the heart rate and blood pressure charts which are hung at the end of every patient’s bed in well a run hospital.

3.2 Current KPI initiatives in South Africa

Water supply in South Africa is not short of KPI systems and initiatives, for there are many organisations involved in the various water supply programmes. A selection of these indicators is described below:

3.2.1 The Department of Water Affairs and Forestry's Monitoring and Evaluation Programme

The Department of Water Affairs and Forestry's Monitoring and Evaluation Programme (Version 4.4) is primarily focussed on tracking the planning and implementation of projects. Through this system one can quickly find out whether a business plan has been submitted, whether it has been approved and what the approved budget is. If it has been constructed one should be able to find out how many people were employed on the project, and the labour split between women and men. This system does not include much information on the operational status of schemes. A sample DWAF M&E report on a project is included in Appendix F.

3.2.2 DWAF/NORAD Monitoring Pilot

The Department of Water Affairs and Forestry, working with the Council for Geosciences and with funding from the Norwegian government, has developed a monitoring and evaluation system for rural water supply. In its first draft, this system comprised no less than 57 indicators, with each of these requiring (on average) answers to five separate questions. The total number of questions was 280. Each indicator fell into one of the six categories (Economy, Social, Institutional, Water, Environment and Infrastructure). The total scores for the indicators for each of the six categories were then expressed as a percentage of the possible maximum, with the combined result being represented on a kind of plot called a fractal surface. An example of such a plot is shown in Figure 1 below:

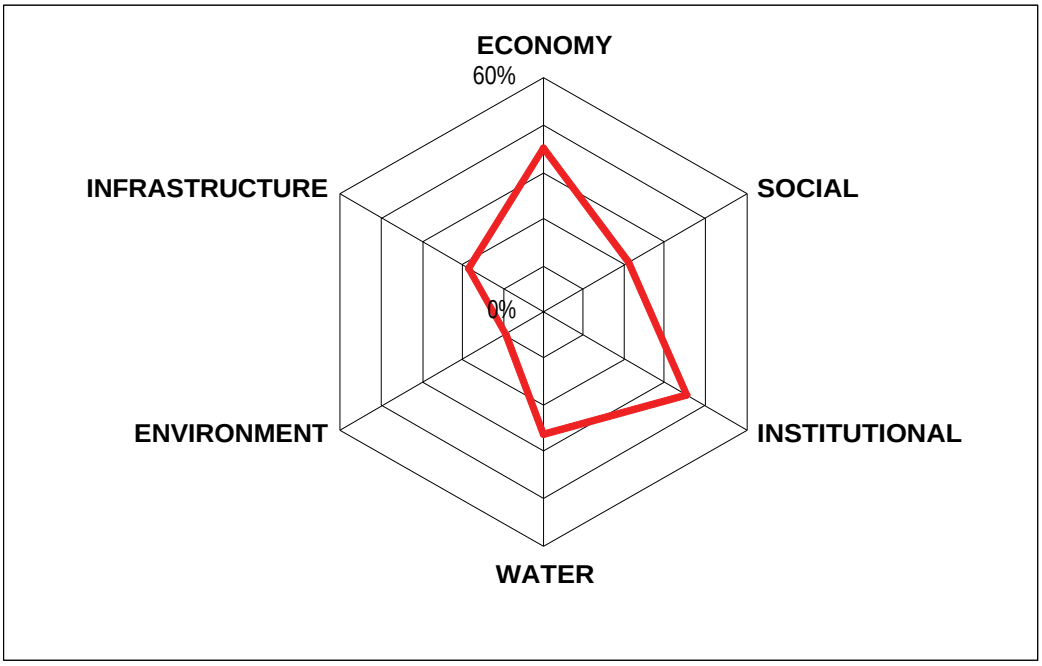


Figure 1: *Fractal surface showing summation of KPIs for a particular scheme (Norad/DWAF, 2002)*

This evaluation system has since been extensively modified, but the original system is still worth noting, for it contained just about every question one could conceivably want to ask about the health of a water project. A copy of the first draft of this system appears in Appendix G.

The Norad sustainability model referred to above has since been completely reworked by Mr Leslie Strachan of the Council for Geosciences, and is now known as “SusIT”, which stands for “Sustainability Indexing Tool”. SusIT is a sophisticated artificial intelligence software package which presents the user with a series of questionnaires relating to, amongst other factors:

- Political support
- Institutional Set-up
- Economic and financial issues
- Water and Sanitation options
- Role of external support agencies
- Communications
- Community support and involvement
- Gender representivity
- Health and hygiene
- Institutional capacity/human resources
- Services provided by the WSA/WSP
- Cultural and social acceptance issues
- Water handling practises
- Energy Sources

SusIT is a standardized assessment and evaluation tool for rural water schemes in southern Africa. It links the user to a central database and analytical software maintained at the Council for Geosciences. This database is pre-loaded with practical and administrative information, such as place names with their administrative and political profiles. It is able to store photographs, contact details, location maps, various kinds of field data, and is able to generate a wide variety of reports.

Modeling results and summary reports are produced in Excel format and include:

- Model report
- Sensitivity analyses
- Test results
- Summary sensitivity statistics
- Ranking of sensitivity graphs
- Observed vs. predicted sustainability graphs

The SusIT software is available for downloading from the Department of Water Affairs and Forestry website www.dwaf.gov.za.

3.2.3 The Human Sciences Research Council

The Human Sciences Research Council has been undertaking work, again on behalf of DWAF, investigating the sustainability of community water projects. This started out as a study restricted to KwaZulu-Natal, but was later expanded to include other provinces as well. This KwaZulu-Natal study placed the 23 projects evaluated in one of four categories:

- not working
- problematic but working
- functioning
- sustainable

To qualify as fully *functional* a project had to score positive on each of the following four KPIs:

- water flowing regularly from most of the standpipes and taps
- serving >75% of the population to RDP standards
- sufficient funds available for emergency repairs
- local or regional public administration making it possible to continue with O&M

To qualify as fully *sustainable* a project had to pass the following criteria:

- regular supply in virtually all the standpipes
- regular operations and maintenance
- provision at RDP standards: standpipes within 200 m of households and availability of 25 litres per person per day
- income received covering the costs of upkeep
- inclusion of the poorest in the community
- free water provision
- consistent support and planning from the District Municipality

The HSRC team recently commenced a follow-up research project under the auspices of the WRC, with the objective of developing and testing a model for the monitoring of water supply services. This project is due to be completed by March 2007.

3.2.4 Mvula Trust/DWAF

In November 2000 DWAF published another monitoring study, entitled “Developing Community-based Monitoring and Evaluation Tools for Rural Water and Sanitation Projects”, which was written by the Mvula Trust. This study contains the following flowcharts and monitoring sheets:

- The Cost Recovery Flowchart
- The Cost Recovery Flowchart
- The Bookkeeping Flowchart
- Logbook: Daily Monitoring Sheet
- The Healthy Taps Flowchart: (1) Water Flowing
- The Healthy Taps Flowchart: (2) Water Loss
- The Healthy Taps Flowchart: (3) Pump/Engine

- The Healthy Taps Flowchart: (4) Reservoir

These monitoring tools are attractively designed and clearly laid out. They should be very useful as management tools. They are reproduced in Appendix E.

In October 2000 the Mvula team responsible for these guidelines held a workshop with CWSS stakeholders (including representatives from district municipalities). The following were identified as additional tools required:

- Tools for measuring water loss
- Tools for monitoring water quality (borehole and bulk)
- Tools for monitoring groundwater levels and quantity at source
- A simple, visual troubleshooting checklist for the pump attendant to monitor the pump
- A checklist to assist sanitation and health committees to monitor targeted health practices, based on intervention plans developed through household participation.
- A logbook-style maintenance and service record. This would serve as a record of who serviced particular equipment, when, at what cost, etc.
- A tool to monitor water consumption levels at various points in the community

It is notable that the "tool" required for both the first and the last points above is simply a water meter, or set of meters. It is how one manages the meters and processes the information that community and WSP staff need help with. A specific study dealing with this very issue was carried out under the umbrella of this research project during 2001, and has been described in the separate report: *The Development of a Successful Unaccounted-for Water Management Programme in the Rural Water Supply Context*, by Janet Ross-Jordan, which is to be published by the Water Research Commission in conjunction with this report.

3.2.5 Watsup Development

In November 2000 Ian Pearson of Watsup Development produced a set of project monitoring and evaluation tools on behalf of the Rural Development Services Network. One of these is entitled *"Rural Water Supply Projects: Check List No. 4. Operation and Mentorship"*. This is a comprehensively detailed evaluation tool, with 79 separate questions to be answered, many of which do not have simple yes or no answers. A copy of this Check List is reproduced in Appendix H. This system can be used to structure a one off evaluation of a project, but is too detailed to be used in its entirety for routine monitoring.

3.2.6 Peter Ramsden/DWAF

In 2002 Peter Ramsden was commissioned by the Department of Water Affairs to compile a summary of KPI systems relevant to government functions. Some of these related more to the achievement of goals in project implementation, and others to the performance of Water Services Authorities (e.g. How many WSAs have completed their Water Services Development Plans? How many have drafted their bylaws? etc). One set, however, which is of more relevance to the monitoring of water services is the "*regulations relating to compulsory national standards and measures to conserve water"*, which are promulgated in

terms of the Water Services Act, 1997 (Act No. 108 of 1997). These are reproduced in Appendix I. In terms of these regulations a Water Services Authority must report within four months of the end of the financial year on, inter alia:

- the number of user connections in each user sector
- the number of households provided with water through communal water services works
- the number of consumers connected to a water reticulation system where pressures rise above 900 kPa at the consumer connection
- the number of new water supply connections made
- the total quantity of water unaccounted for

In November 2003 the results of a national audit on compliance with this requirement to report yielded the following results:

Table 1: System for WSDP Reporting and Water Services Audit (Ramsden, 2003)

	System Operational and Information Available
Western Cape	33%
Mpumalanga	6%
Northern Cape	0%
Free State	0%
Limpopo	0%
Eastern Cape	20%
KwaZulu Natal	22%
Gauteng	0%
North West	20%

The national average of these figures is 11.2%.

3.2.7 Atkinson and Wellman / Water Research Commission

Atkinson and Wellman's (2004) WRC report “A Monitoring and Evaluation Manual for Municipal Water and Sanitation Management” is a comprehensive manual and workbook for WSAs to use in developing an effective system of operation and maintenance (O&M) coupled with monitoring and evaluation (M&E).

It answers both the *why* and *how* of goals, targets and indicators, while providing useful examples and step-by-step processes for O&M and M&E. The primary topics that need to be addressed are listed as:

1. Selection of goals, targets and indicators
2. Resource inventories – counting what you've got
3. data collection
4. Interpreting and analysing data
5. Report to senior management and council
6. Feedback and dissemination
7. Public participation in monitoring and evaluation

8. Budgeting for O&M and M&E
9. Returning to the goals: evaluation

These topics provide a useful framework for WSAs to develop their own relevant indicators and targets.

3.2.8 Stevenson/Water Research Commission

Stevenson's (2000) WRC report on “Asset Management for the Water Services Sector in South Africa” deals with an often neglected area of water services. At the time of the report, very few municipalities had a system of asset management in place. The report provides an extensive review on international practice and the importance of asset management in the South African context. Four case studies provide practical applications to prove its usefulness. Also very useful are detailed guidelines on preparing an asset management plan and an explanation on how to set up an asset register. A user guide to the Impahla software developed as a part of the research provides a tool for all WSAs and WSPs. This software is available at www.wrc.org.za/wrcsoftware.

3.2.9 Pybus/Water Research Commission

A report titled “Guidelines for the Implementation of Benchmarking Practices in the Provision of Water Services in South Africa” was completed for the Water Research Commission by Pybus in 2002. The guidelines are targeted at all sectors of local authority involved in water and sanitation services. They recommend a set of steps to develop an effective benchmarking system, which would help WSAs to meet their statutory reporting requirements.

This study covers both theory and practical tools, giving the broader context of benchmarking internationally and building a solid argument for the positive results possible. One of the products of the study is a list of 101 suggested KPIs which fall into five categories (the indicators are based on those developed by the South African Association of Water Utilities (SAAWU) in 2001, in order to try and build standardisation within the country):

1. service delivery
2. financial credibility
3. technical effectiveness
4. human resources
5. background information

Although the list is extensive, Pybus emphasises that not all the indicators are necessary. The list is comprehensive and is intended to cover all levels and types of water services. The key is for each body to determine the critical evaluation areas and to focus only on those that are key to operation and/or contribute to efficiency and effectiveness.

The top 30 KPIs were selected by local authorities and are shown in Table 2 (below). These 30 are correlated in the report with similar indicators developed by SAAWU and the International Water Association.

3.2.10 Schoeman and Magongoa/Water Research Commission

The Pybus report on benchmarking was based on desktop studies and was followed by a pilot study to test their validity. The WRC report by Schoeman and Magongoa (2004) titled "Community Identified Performance Indicators for Measuring Water Services" identifies indicators that are viewed as relevant by communities. An in-depth survey in residential areas ranging from high income to informal settlements was undertaken and the results show a high concordance with the Pybus study in terms of what is viewed as good service delivery. This confirms the relevance of the WRC benchmarking study and the "top 30" listed in Table 2.

Table 2: Comparison of Top Thirty Performance Indicators (Pybus, 2002 pg 16)

No.	Category	Concept	Water Research Commission	South African Association of Water Utilities	International Water Association
1.	Water Supply: House connection	Percentage of total houses and businesses served with potable water	No. of houses and businesses served / total number of houses and businesses x 100	Number of people served / total number of people	Number of households and businesses connected to the public network / total number of households and business x 100
2.	Water Supply: Yard or communal tap	Percentage of total houses and businesses served with potable water	No. of houses and businesses served / total number of houses and businesses x 100	Not specified but included in an overall indicator.	Resident population served by the water undertaking through public tap or standpipes / total resident population
3.	Customer Coverage: Waterborne sewerage connections	Percentage of total houses and businesses served with waterborne sewerage connections	No. of houses and businesses served with waterborne sewerage connections / total number of houses and businesses x 100	Not applicable	Resident population served by sewerage systems / total resident population x 100
4.	Customer Coverage: On site sanitation	Percentage of total houses and businesses served with On site sanitation	No. of houses and businesses served with waterborne sewerage connections / total number of houses and businesses x 100	Not applicable	Not covered
5.	Service Reliability: Water	Supply infrastructure failures	Total number of supply infrastructure failures	Total number of supply infrastructure failures	
6.	Service Reliability: Wastewater	Blockages leading to overflow of sewage into areas accessible to public due to all causes	Total number of spills / 100 km of sewer per year	Not applicable	Number of sewer blockages during the year / total sewer mains length *NB. This does not imply overflow.*

No.	Category	Concept	Water Research Commission	South African Association of Water Utilities	International Water Association
7.	Liquidity Analysis	Debt service ratio	Net income excluding interest paid and depreciation / total debt service	Net income excluding interest paid and depreciation / total debt service	Cash Flow / annual financial debt service x 100.
8.	Financial Efficiency	Collections efficiency – amount	Total amount received / total amount billed in accounting period x 100	Total amount received / total amount billed in accounting period x 100	Not applicable
9.	Profitability Performance	Operating surplus	Net income / operating revenue x 100	Net income / operating revenue x 100	No comparable indicator
10.	Unaccounted for Water	Volumetric financial loss	Total value of water that has been billed / total value of water that has been put into the networks x 100	Quantity of water abstracted form the primary source less water lost in treatment less the water sold / actual water production at treatment works x 100	Non-revenue water / system input volume x 100
11.	Equipment Availability	Assurance of supply – delivery capacity	Average available delivery capacity / required delivery capacity	Available delivery capacity per day / annual average daily demand x peak factor	No comparable indicator
12.	Customer Response	Average time of responses to queries and complaints	Average time of responses / total number of calls	No comparable indicator	Response to written complaints. Number of written responses within the target time / number of written complaints during the year x 100.
13.	Customer Response: Sanitation	Time to respond to request to empty septic tank, conservancy tank or pit latrine	Average time from receipt of request to the actual emptying of the tank	Not applicable	Not considered
14.	Water Tariff: Bulk Water	The average tariff paid for the entire system	Total amount paid for potable water for the year / the total volume put into service in mega litres	Total amount charged for potable water for the year / the total volume put into service in mega litres	Annual water sales revenue from residential, commercial, industrial, public, institutional and other customers (exported water excluded; public water taxes excluded) / (total annual authorised – exported water)

No.	Category	Concept	Water Research Commission	South African Association of Water Utilities	International Water Association
15.	Service Reliability	Supply infrastructure failure leading to disruption of service	Total period in hours during the reporting period for which service was disrupted as a result of a supply infrastructure failure / total number of hours in period x 100	Total period in hours during the reporting period for which service was disrupted as a result of a supply infrastructure failure / total number of hours in period x 100	Defined as water interruptions. Σ (Population subject to a water interruption x duration of interruption in hours) / (population served x 24 x 365) x 100
16.	Service Reliability: Wastewater	Blockages leading to overflow of sewage into areas accessible to public due to ingress of roots	Total number of spills / 100 km of sewer per year	Not applicable	Number of overflow discharges occurred during the year / number of overflow devices
17.	Commercial Equity	Percentage of orders placed with previously disadvantaged companies (PDC)	Value of orders placed with PDC's / total value of orders placed x 100	Value of orders placed with PDC's / total value of orders placed x 100	Not covered
18.	Equipment Availability	Assurance of supply – delivery capacity	Average available delivery capacity / required delivery capacity	Available capacity per day / annual average demand x peak factor.	Not covered
19.	Storage Capacity: Available	Percentage of utilised capacity to available capacity	Utilised in Mℓ/d / available Mℓ/d x 100	Available water storage capacity per day / annual average demand x peak factor	Total capacity of transmission and distribution storage tanks (private storage tanks excluded) / [authorised consumption (including exported water) + water losses] x 365
20.	Staffing Issues	Staff turnover percentage	Total number of exits / total number employed x 100	Total number of exits / total number employed x 100	Not covered
21.	Staffing Issues	Staff absenteeism percentage	Total number of days absent / total available days x 100	Total number of days absent / total available days x 100	Total number of days of absenteeism occurring during the year / total number of full time equivalent employees.
22.	Local Authority Water Services Statistics	Employee complement	Average number of employees on a monthly basis	Not covered	Number of full time employees of the water undertaking / number of service connections.
23.	Local Authority Water Services Statistics	Water sold	Average number of megalitres sold on a monthly basis	Not covered	Annual input of the transmission system / 365

No.	Category	Concept	Water Research Commission	South African Association of Water Utilities	International Water Association
24.	Customer Response: General	Percentage of unsatisfied complaints or queries	No. of repeat calls where the customer has not received satisfaction / total number of calls x 100	No. of repeat calls where the customer has not received satisfaction / total number of calls x 100	Defined as 'continuity complaints'. Number of continuity complaints during the year / number of service complaints during the year x 100
25.	Sewer Tariff	The average tariff charged for the entire system with water borne sanitation	Total amount charged for water borne wastewater services of for the year / the total no. of sewer connections	Not applicable	Note: treatment and collection treated separately. Also sub-divided into capital and running costs. *(WWT annual running costs + WWT annual capital costs) / treated wastewater in WWTP.*
26.	Sanitation Charges	The average tariff charged for the entire system using on site sanitation	Total amount charged for on-site sanitation services/total number of properties with on-site sanitation	Not applicable	Not covered
27.	Energy Efficiency	Energy cost for the treatment of wastewater	Total electricity costs for the treatment of wastewater / megalitre of wastewater treated	Not applicable	Energy consumption at WWTP / treated wastewater in WWTP x100
28.	Equipment Maintenance	Unplanned to total maintenance cost	Unplanned maintenance cost / total maintenance cost x 100	Unplanned maintenance cost / total maintenance cost x 100	Not specifically covered. The maintenance costs for different components of the schemes are called for in relation to the number: capacity etc
29.	Liquidity Analysis	Debtors days – debtors collection period	Trade debtors / credit sales x days in accounting period	Trade debtors / credit sales x days in accounting period	Defined as late payments ratio. [1-(annual debt from customers / annual amount billed during the year) x 100
30.	Health and Safety	Man days lost percentage	Total man days lost / Total available man days x 100	Total hours lost / total available hours x 100	Note: Time lost due to working accidents and to absenteeism dealt with separately. Number of working accidents requiring medical care during the year / total number of full time equivalent employees.

3.2.11 The District Information Management System (DIMS)

A problem that is commonly observed with municipalities is that it is very difficult for them to keep track of information regarding their infrastructure. Although feasibility studies, business plans, completion reports, as-built drawings and operations and maintenance (O&M) manuals are typically required for all new projects, when something goes wrong after several years it is not unusual for no-one to have any idea where those documents are to be found. Similarly, every time a new survey or data base is commissioned by DWAF, the original consulting engineer is asked to help to supply the information, even if he has not had anything to do with the project for years. This phenomenon is perhaps largely due to the substantial degree of restructuring and personnel change which all municipalities have undergone in the last ten years. However, it is also a reflection of how hard it is to keep track of paper based information, especially when there is a regular turnover in the staff responsible for managing the information.

The District Information Management System (DIMS) is an Internet-based programme management system which may well be the future of municipal governance in South Africa. It can be viewed at www.dims.org.za. It has been developed by the Pietermaritzburg based IT company Intermap, who have been working closely with the Department of Local Government and Housing and the Development Bank of Southern Africa. Piloted in the uThungulu District Municipality in 2002 and 2003, it is now in the process of being rolled out to the rest of KwaZulu Natal's District Municipalities as well as two in the Eastern Cape. The system handles information under the main categories of Integrated Development Plan (IDP), Project Management, Performance Management, Asset Management, Finance, Procurement and Human Resources. The system will enable municipal managers to keep their fingers on the pulse of every aspect of their organisation (provided the system of data collection and entry is sound - which will only be the case with active verification and good management).

The category which deals with the monitoring of completed projects (of any kind) is "Asset Management". The data fields under asset management are, however, specific to the type of project which is being referred to, and to the requirements of the municipality. For the uThungulu District Municipality's water projects monthly reports are captured giving information including the following:

- Source description
- Length of bulk pipeline
- Length of internal reticulation
- Number of stand pipe connections
- Number of household connections
- Volume of Water Abstracted
- Volume of Water Treated
- Electricity kW used
- Chemicals used
- Staff costs
- Free chlorine
- Total chlorine

- Turbidity
- pH

An example of the report on the data currently monitored for water projects is shown in Appendix K.
DIMS is potentially a very powerful management tool. If all of a municipality's rural water projects and infrastructure are captured on the system, then it is a simple matter to compile reports on virtually any aspect of the data. Obviously the accuracy of the reports will depend on the accuracy of the data in the system, but once the basic data is captured and verified, it should not have to be found again.

3.3 The Alfred Nzo District Municipality - KPI and Benchmarking in Practice in rural SA

Since 2001 the Alfred Nzo District Municipality (ANDM), which is located in the northern part of the Eastern Cape, has been operating and maintaining most of its rural water projects using three Services Support Agents, each contracted to look after a group of village water schemes. A total population of 390 000 are served by 130 schemes which range in size from small standalone schemes to large regional schemes. The Services Support Agents (SSAs) use Community Based Organisations (CBOs) to fulfil as many of the operation and maintenance tasks as possible, including some reporting. (Illing and Gibson, 2004).

In each village the contracted services support agent works with a community level "Water Services Provider", which comprises a small number of elected members of a community organisation known as the village water "board". These members in turn have oversight, with the SSA, over community level staff, who do the day to day operation and maintenance (the system is described in the Mvula Trust's "Village Level Action Plan", which was written for the ANDM in 2001). The system is very cost-effective, with reasonably reliable water services being made available to villagers at no cost to themselves, and at a cost to the ANDM of less than R4.00 per capita per month (ANDM, 2004).

Maluti GMS in association with Mattcom jointly form one of the SSAs. In the course of their work they developed a series of Key Performance Areas, milestones and benchmarks to provide a management and reporting tool. The following information is from a paper presented at the WISA biennial conference in Cape Town, May 2004 by Illing and Gibson:

Methodology
This methodology is a guideline for WSPs to develop a system of continued high level of service.

i. *Identify Key Performance Areas (KPA) of the WSPs*
ii. *Identify key milestones (developmental and technical)*
iii. *Develop a scheme classification system (compare like with like)*
iv. *Identify the most appropriate organisations to fulfil the various responsibilities*
v. *Determine financial requirements*
vi. *Develop a reporting system*
vii. *Establish benchmarks*

The first and the last steps are of primary interest. From the research paper, the following KPAs are identified: daily operations; maintenance; administration; reporting; customer relations and communication. Each of these areas needs to have specific indicators and targets to measure the status. These should be submitted monthly to the WSA in a report.

A monthly operations and maintenance report is one of the basic systems at the foundation of the SSA programme. A copy of one of these reports is reproduced in Appendix J. This report is simple enough to be filled in as part of a routine monthly meeting, and the SSA can use it to compile a monthly report to the ANDM.

The field level report captures the following information:

- Supply of Water (poor/good/excellent)
- Visual Quality of Water (muddy/murky/clear)
- Taste of Water (salty/chlorine/pure)
- Number of street taps
- Number of private taps
- Number taps with no water
- Number of taps leaking
- Number of taps working
- Number of taps taking longer than 1 minute to fill a 10 litre bucket
- Record of interruptions of supply
- Consumption records
- FBW usage level
- Repair and Fault record
- Financial Health Report

To this is appended a cover report prepared by the SSA, which also reports on any laboratory tests which have been done on water samples, on unaccounted for water, on costs per person, and on tools and equipment.

The SSA then combines the reports for all the villages under its supervision into one summary report, which is submitted to the ANDM on a monthly basis. This report in turn has summary sheets which combine all the information in one page per ward, and in one line per village. That summary gives the following headings per village:

- Population
- Quality (e-coli/100 ml), if sampled in the month
- Quantity (% of FBW)
- Continuity (% operating)
- Cost of service (as % of budget allowed)
- Repairs (key items described)

- ISD (good, acceptable, problematic)
- Incidents
- Sanitation (if anything is happening)

The fields are colour coded, to enable the reader's eye to immediately pick out where the service is acceptable, and where it is not. Samples of these reports are included in J.

In essence the ANDM SSA system is functioning on a 3 level system. At the ground level, simple data capturing is practised, and most of this does not need to be done by technical staff. At the SSA, this data is analysed and a more sophisticated, but still easily assimilated, village report is produced. That is the second level. The third level is the compilation of the monthly progress report for the group of villages under the SSA's care. This combines the village level reports into tables, colour coded so that problems are flagged for the ANDM's attention.

Having had this system in place for three years now, the SSA has been able to develop performance benchmarks. These are specific to the ANDM, but are a practical example for other rural water service providers. The benchmarks are found in Table 3 below:

Table 3: Current benchmarks used by the ANDM water service providers

Management Focus Area	***Current Benchmarks***
Quality of water supplied	Sampled monthly on all projects
	0 e-coli = good
	0-10 e-coli = acceptable
	>10 e-coli = poor
Quantity of water	10l per capita per day (RDP service)
	15kl/month private connections
Continuity of supply	>98% tap-days operational = good
	80-98% tap-days operational = acceptable
	<80% tap-days operational = unacceptable
Financial	Cost per capita ranges from R1.58 to R3.16 for a population of 390 000
Performance of CBOs	Meetings held and minutes submitted each month
	Reports submitted monthly

The important thing about the ANDM system is that it has not just been developed in theory, it is being used every month to provide a framework for water management in over 100 villages.

3.4 Discussion

These are only some of the initiatives that have been initiated in South Africa. The systems range from those relevant to WSA planning and overall management, to project level systems that can be used by communities and WSPs. A summary and comparison of the type of indicators many of these systems include is found in Table 2 above. This comparison is taken from Pybus (2002) and contains some benchmarks more applicable to larger water utilities, but it also contains benchmarks relevant to water supply systems in any context.

Of the various monitoring systems described above, two are of most interest as far as the monitoring of operating rural water schemes is concerned. These are:

- The Alfred Nzo's District Municipality's monitoring system, which is based on a simple, clear and practical field report which can be compiled by an individual with relatively little technical training. The way that these reports are summarised and presented in the monthly reports makes it a relatively simple matter for a Water Services Provider or Water Services Authority to monitor the status and condition of all its projects.
- The District Information Management System, or DIMS, which is an internet based municipal management system, and which ensures that information, once captured, is retained and can be reviewed and reported on in an almost unlimited number of ways.

The ideal system would be one that combines the practicality and usefulness of the former with the convenience and power of the latter.

4. METHODOLOGY

A selection of KPI initiatives currently under way in South Africa were reviewed. Data was also collected regarding a set of rural water supply benchmarks in three different provinces of South Africa (Limpopo, Eastern Cape and KwaZulu-Natal), and the benchmarks are discussed.

A set of key performance indicators were developed for use in the management of community based rural water projects. Four projects were used for these trials over the project duration, which lasted for approximately two years. The ability of the community level staff to understand the information was assessed and conclusions were drawn regarding its usefulness.

A spreadsheet based reporting system, originally developed by Umgeni Water for its RDP water projects, was then adapted to enable it to be used to report on the KPIs developed as part of this project.

As a by-product of this research the KPI methodology was used to assist two of the communities to reduce the levels of unaccounted for water which they were experiencing. This work has been written up in a separate research report, of which a summary appears in Appendix D.

4.1 Benchmarks in rural water supply

As part of this work the following four benchmarks in rural water supply have been researched:

i) capital cost per family served;
ii) number of families served per tap;
iii) length of piping per family served; and
iv) cost of operation and maintenance.

The first is of interest because it gives one an indication of how much money might still be required to meet the water supply backlog in South Africa, which was shown in Section 2.4 above to be 10.9 million people. The second is of interest because it gives an indication of the level of service that is being provided on our rural water projects. The third is of interest because it illustrates how differences in settlement patterns and also service levels affects design norms. The final benchmark is of interest because we need an idea of what it is presently costing authorities to run rural water schemes in order to budget to operate and maintain these supplies in the future.

Data has been collected from 76 projects, of which 53 were in KwaZulu-Natal, 8 were in Limpopo Province and 15 were in the Eastern Cape.

The results are written up in Section 5.3 of this report.

4.2 A draft set of Key Performance Indicators for rural water supply

At the outset of this study the hypothesis being tested was that with a basic set of KPIs a Water Services Authority(or its field agent) would be able to gain a good indication of the health of any rural water scheme. Moreover, it was suggested that community level staff could be taught to record and chart these KPIs, so that they themselves would have a better understanding of the status of their water supply. The set of indicators that was proposed is described below.

4.2.1 Service performance indicators

4.2.1.1 Number of supply points in working order

Description: A simple count of the number of functioning standpipes or household connections is a direct indication of Operation and Maintenance status.

Indicator = Number of functioning supply points (communal and private)

Notes:

i) Maximum on Y-Axis gives number of homes in the community.

ii) This indicator also points to the actual benefits that the water supply system provides because it is indirectly related to: (i) the % of the population using the system, and (ii) the per capita water consumption.

iii) "Functioning" means operational at least long enough every day for users to obtain their water requirements.

4.2.1.2 Continuity of water supply

Description: A characteristic of many rural water supply systems is that the bulk supply is discontinuous, particularly in the case of stand-alone systems reliant on pumps. The cause of the failure may or may not be beyond the control of the Water Services Provider.

Indicator = (Number of "tap days" working/Potential number of "tap days" in month) x 100

Notes:

See Section 6.1.2 for an explanation of how tap days are counted. A tap day can be counted if users received water for long enough to meet normal requirements.

4.2.1.3 Water consumption

Description: The provision of an adequate quantity of potable water is crucial if anticipated health benefits are to be realized. Consumption is a function of tariff, reliability, distance to supply and availability of alternative sources of water.

Indicator = Litres used per day/Population served

Note: Litres used per day is the summation of the metered use at all points of consumption, whether public or private. If there are no meters, then some reasonable allowance must be made for water losses. For a rural water supply scheme a default figure of 30% losses (measured as a % of bulk supplied) can be used, although in reality the losses are often found to be higher than this.

4.2.1.4 Water quality

Description: A water quality monitoring programme can detect any changes in water quality, which may indicate an Operation and Maintenance problem.

Indicator = % of Daily Quality Determinants (Look, Taste, Smell and Disinfection Status) which are acceptable to the users)

Notes:

i. For most WSPs it is not practical or economical to perform even limited laboratory tests on the water quality from a rural water scheme more than once per month.

ii. A system of community surveillance is therefore essential if more complete monitoring is to be achieved. Every day a water sample is taken in a glass sample bottle. This is evaluated against three qualitative criteria (acceptability of appearance, taste and odour), and one quasi-quantitative criterion (is the chlorinator working?). If all four of these criteria are positive, then each of four blocks against that day's date are coloured green. If one or more is not acceptable, then those blocks are coloured red. The samples are retained until the monthly review meeting, where they can be viewed by members of the committee/government officials etc. After the review meeting the water is discarded, the bottles are cleaned, and they are then re-used.

iii. To test whether the chlorinator is working, a simple swimming pool test kit colour comparator test can be used, however the sample has to be taken from a point in the scheme where a chlorine residual can be expected. If there is a slight colour in the water then that colour can easily be confused with residual chlorine on the comparator colour scale.

iv. Other test methods (e.g. colilert tubes and H_2S strips) can be used as back up methods to enable the community to establish if there are any coliforms in their water supply. In cases where no chlorine is used in the disinfection process, sanitary surveys and occasional laboratory tests must be used to monitor bacterial quality.

v. As this test requires that qualitative criteria are used, the standard of what is acceptable and what is not has to be determined on a site specific basis by the Water Service Authority.

4.2.1.5 Water losses

Description: Water losses are a useful indicator of the overall integrity of a scheme, both in terms of infrastructure and management.

Indicator = (Bulk water obtained/Total water sales) x 100

Notes:

i) Often the reading of bulk meters and consumer meters do not exactly coincide, and thus the "loss" figures on a month by month basis can be misleading. A three-month moving average is more helpful.

ii) There are other ways of expressing water losses which are more meaningful. Two of these are litres lost per customer per day; and litres lost per kilometre of pipe per day. The use of these indicators enables comparison between schemes, whereas the overall % indicator described above is only useful when one is looking at trends on one scheme by itself.

4.2.1.6 Response time for new connections

Description: The Water Service Provider needs to be responsive to the needs of consumers. The time it takes, from the time of application (and payment) to install a new connection will affect user satisfaction.

Indicator = 100% / Average number of months taken to install new (paid up) connection

4.2.1.7 Stock control

Description: Effective stock control relies on: (i) whether regular stock-takes are carried out, and (ii) whether minimum stock levels of spare parts are maintained. Not having the required parts (especially critical items) in stock may seriously affect the Water Committee's ability to provide a reliable water supply.

Indicator = (Number of necessary items in stock / total number necessary stock items) x 100

Notes:

In order for this criterion to be evaluated it is necessary for the Water Service Provider to have a list of the stock items considered necessary for the maintenance of the scheme.

4.2.2 Financial indicators

4.2.2.1 Unit cost of water

Description: Knowledge of the real unit cost of water is essential to understanding the financial health of the scheme, and to the setting of appropriate tariffs.

Indicator = Total of all costs/kilolitres of water sold

Notes:

i) The unit cost of water should be compared with the tariff being charged for water.

ii) This indicator needs to be averaged over a period for meaningful analysis. It is suggested that a twelve month moving average is used.

iii) The operation and maintenance (O&M) costs included in this indicator are for those costs incurred by the Water Services Provider. It is recommended that the costs of any externally funded mentorship or management support services are excluded until the project is functioning smoothly (a twelve month period may be used as a default), and are thereafter included.

iv) Apart from the O&M costs, there are also capital costs, overhead costs and asset replacement costs. Some of these costs may not be for the WSP's account. This indicator should include all costs for the WSP's account, but no more. For a full discussion of how to analyse rural water tariffs, refer to the WRC report

4.2.2.2 Profit/loss for period

Description: The Profit/Loss indicator shows whether sales are exceeding expenditure. The Water Service Provider must receive more money than it pays out each month if it is to remain in business. The scheme is in a healthy position if this indicator is consistently greater than 0%.

Indicator = 100 x (Total sales for period - Total expenditure for period)/Total sales

Notes:

i. Accounts receivable (i.e. debtors) is part of sales.

ii. A portion of arrears may have to be written off each year according to the probability of being paid.

iii. Use a twelve-month moving average to smooth out monthly variations.

iv. Equitable Share in come must be included if this is part of the financing scheme

4.2.2.3 Cash balance

Description: Depending on the amount of cash tied up in arrears, a Water Services Provider might be running into a cash flow problem. This indicator will indicate positive or negative trends.

Indicator = Closing balance at end of previous month - Payments in current month + Receipts in current month

This indicator would only be important at scheme level if the WSP exists solely to serve that project (eg a village water committee).

4.2.2.4 Late payments

Description: A Water Services Provider needs to be aware of trends in its debtors book. If the ratio of accounts receivable (arrears) versus sales is steadily growing, it means that consumers are getting further and further behind in their accounts.

Indicator = 100 x (Total of arrears for period)/(Total of sales for period)

Notes:

i. Use a twelve-month moving average to smooth out monthly variations.
ii. This indicator will clearly not be relevant in an area where there is no billing for water used.

4.2.3 Other indicators

4.2.3.1 Financial accountability

Description: Good management is not possible without financial accountability. The most basic requirement is that all income and expenditure is recorded. From these records, income and expenditure statements can be drawn up and the financial health of a system can be assessed.

Recommended ratings for this indicator are as follows:

O% if the Water Services Provider either cannot or will not disclose details of their expenditure

33% if the Water Services Provider is happy to open its records, but they are incomplete and/or inaccurate and/or disorganized

67% if the Water Services Provider is keeping complete and accurate cash books for both their Petty Cash and their Current Account.

100% if the Water Services Provider is able to produce an income and expenditure statement from their cash books (including accounts payable and accounts receivable) as well as a balance sheet.

4.2.3.2 Accountability "up" to Water Services Authority

Description: Section 22 of the Water Services Act makes it illegal for a Water Services Provider (WSP) to operate without the written permission of the Water Services Authority (WSA). The Water Services Authority is entitled to obtain information from the WSP regarding the provision of water services to people living in the area of supply. Regular reporting by the WSP to the Water Service Authority is therefore essential.

Indicator = (Number of reports submitted / Number required to be submitted) x 100

Notes:

i) It is unlikely that any reports will be submitted by the WSP unless they are requested by the Water Services Authority. The Water Services Authority will need to take an active and informed interest in the affairs of the Water Services Provider if it is to get useful reports from them.

ii) It is essential that the Water Services Authority give clear instructions to the Water Services Provider as to what is required to be included in the reports, and that the reporting requirements are both reasonable and achievable.

iii) This indicator could be made more sophisticated by adding a "Quality of Reporting" rating. If reports are complete and accurate, that should earn a 100% rating. Less complete or accurate reports should earn a lower rating.

4.2.3.3 Accountability "down" to the community

Description: The Water Services Provider as Water Services Provider has an obligation to provide adequate water services to the people it serves. Regularly convened community meetings, to which representatives of the Water Services Authority are invited, are considered essential to ensure that problems (and compliments!) are heard.

Indicator = (Number of meetings held / Number required to be held) x 100

Notes:

i. It is essential that the Water Services Authority give clear instructions to the Water Services Provider as to what are the minimum reporting requirements for community meetings.

ii. The most basic requirement for reporting to community meetings is to tell people how funds have been managed.

iii. As with indicator C2, this indicator could be made more sophisticated by adding a "Quality of Reporting" rating. If reports are complete and accurate, that should earn a 100% rating. Less complete or accurate reports should earn a lower rating.

4.3 Reporting systems to capture benchmarks and KPIs

4.3.1 Data collection in the field

4.3.1.1 Water quality

In the case of water quality, the team developed a record sheet with four blocks to fill in for each calendar day. The water committee takes a sample for that day, which is stored in a glass bottle which is marked with that day's date. The first three blocks on the sheet are for the simple look, taste and smell criteria. Does the water look good? Does the water taste good? Does the water smell good? The fourth is for disinfection status.

How can one practically test for disinfection status in the field? The first method investigated is known as the colilert test. A small amount of agar is placed in a 5 ml test tube, and this is filled with a sample of the water that is to be tested. The sample is then incubated using body heat for 24 hours, after which time it is inspected. A clear yellow colour means there are no faecal coliforms in the water, while a black colour means there are faecal coliforms. The test is crude, not being able to distinguish between a water which has, say, less than 10 e-coli per 100 ml, and one which has, say, 1000. The main problem with the test, however, is the methodology. A dedicated researcher might be prepared to sleep with test tubes strapped to his body, but the average village water operator or administrator cannot be expected to do such a test routinely. It was therefore concluded that the colilert test is not very practical or useful in the field. Equally crude, but much simpler and more practical is the H_2S strip test, which is available from the CSIR. With this test a strip of paper impregnated with H_2S is placed in a 100 ml plastic bottle containing the water sample. Without incubation the sample turns black if the water is contaminated, and stays clear if it is not. However, even the H_2S test is not the final solution. It is relatively cheap (R20/test), but even at that price it is too expensive for frequent use by a community-based Water Service Provider. Cairncross has indicated that the most effective method for community level surveillance of water quality is to test for residual chlorine (Cairncross, 2002). If the water is not being disinfected, there is no point in testing for coliforms, because there will definitely be coliforms. If the water is being disinfected, the presence of coliforms is unlikely. A simple swimming pool type test kit is all that is required for residual chlorine testing in the field. If there is no chlorination (or other form of disinfection) taking place, then a routine inspection of the source for signs of contamination is recommended. If the source is a protected spring or a protected borehole, and there has been no deterioration in the protection of that source, then the water quality is very probably still good. An example of a sheet used to collect quality data is shown in Appendix A.

4.3.1.2 Reliability

Reliability is not a simple indicator to assess, and yet in terms of customer satisfaction, there is probably nothing more important. But how is reliability assessed? For example, if the pump is off for two days, but the reservoir is large enough so that there is still water at all the taps for the duration of the pump problem, then there is no impact on reliability. If the pump is off for two days but the reservoir is too small and all the taps are without water on day two, then the pump problem is felt by the consumers. If a pipe breaks, and only 5% of the taps are affected for a week while the repairs are being done, that is an issue

for the customers affected, but most customers are still happy with the service. If another pipe breaks (say the rising main), and all the taps are without water for the week, then that is a much more serious problem.

To enable the reliability indicator to be measured intelligently therefore, the team has developed another sheet which is filled in on a daily basis, with one block to indicate the number of taps in the scheme on that day, and another to indicate the number of taps which were actually working on that day. At the end of the month a percentage score can be worked out to indicate how reliable and effective the scheme has been in that period. The percentage is calculated by summing the *actual* "working tapdays" and dividing by the *potential* total number of working tapdays.

For example, say a scheme has 40 taps, and for 20 days in the month in question, all of them worked. For the other ten days in the month, only 25 of the taps worked, because there was a problem with the bulk pipeline feeding one area with fifteen taps and the supply had to be switched off there while it was being fixed. In this case:

Working tap days	=	20 days x 40 taps + 10 days x 25 taps	=	1050
Potential working tap days	=	30 days x 40 taps	=	1200

Therefore the reliability index for this scheme for the month is 1050 / 1200

= 87.5%

An example of a sheet used to collect reliability data is shown in Appendix A.

A WSP might find that their field staff prefer to report on the number of taps *not* working rather than the number working. However, it would not be difficult to convert this statistic to a reliability indicator as calculated above, provided one does know the number of taps that should be working.

An example of reliability monitored over a period of 27 months at the Nhlungwane water scheme is shown in Figure 2 below.

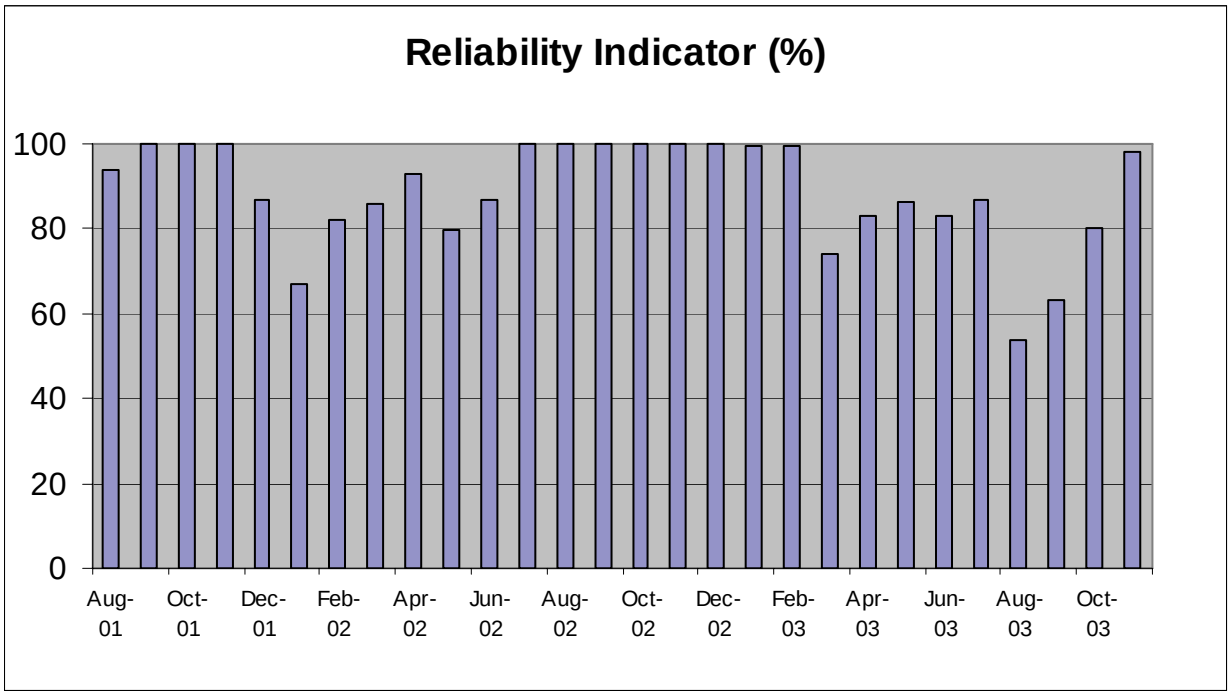


Figure 2: *Example of reliability indicator expressed as tap working days as a percentage of the maximum that would be achievable. This data was collected at the Nhlungwane scheme from August 2001 until November 2003. During 2002 and 2003 the scheme experienced problems with two of its storage reservoirs, which affected reliability*.

4.3.1.3 Source Vulnerability

In many cases the water scheme is reliant on a dam, a spring or a borehole, which must be monitored to ensure that it is not over exploited. If this is so, then a crucial indicator is the water level in the dam or borehole, or the flow in the spring.

A good example of the monitoring of such an indicator has been provided by the CSIR's groundwater programme, who have assisted with the monitoring of a borehole in the Northern Cape. The record of the water table fluctuation over several years, plotted in conjunction with the volume of water abstracted from the borehole, shows clearly the effect of the over-exploitation of this particular source.

Monitoring of boreholes is not that simple to do, although a little planning ahead at the design stage certainly helps. The borehole must be constructed with a piezometer tube strapped to the column, and this tube must be easily accessible at the head of the borehole. The internal diameter of the tube must be at least 25 mm in diameter in order to allow the piezometer (commonly known as a dipper) to be lowered down the borehole to measure the water depth. Electrical conduiting, uPVC pipe, LDPe and HDPe pipe are all suitable for piezometer tubes. The tube should extend down the borehole to just above the pump.

If there is no easily accessible duct through which a dipper can be lowered, it is not possible to measure the level in a borehole without removing the pump head, which is not a simple operation. If there is no conduiting provided right down to the pump level, the chances of the dipper probe being lost in the borehole are good.

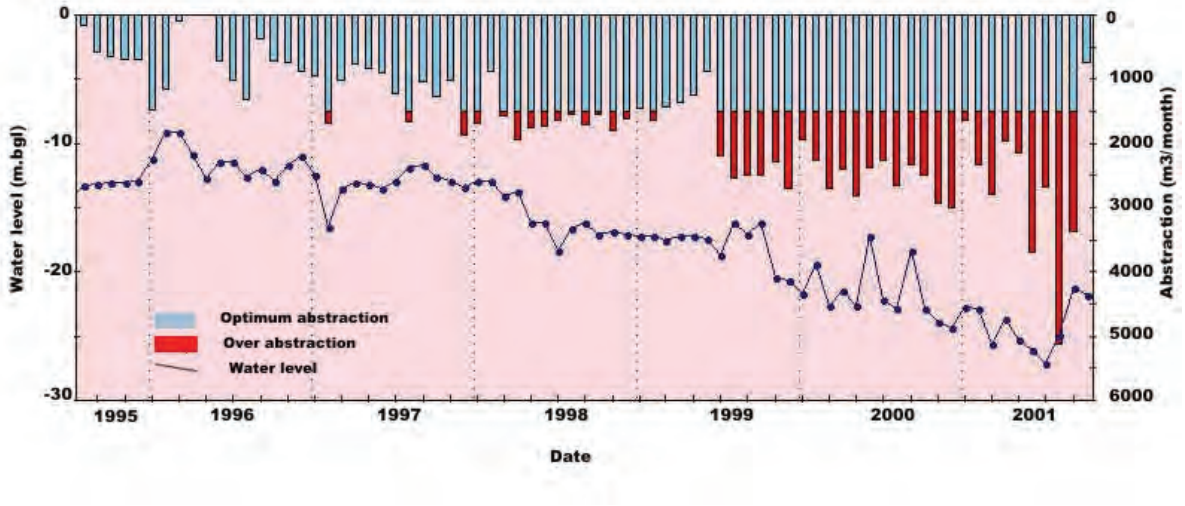


Figure 3: *Example of effective borehole monitoring and reporting using a graphic method (Kharkams Tweerivier Borehole Water Level shown with abstraction rates, Ravenscroft, CSIR, 2003). This figure is an output from the AquiMon software for groundwater management, which can be obtained free of charge from the Directorate: Information Programmes of the Department of Water Affairs and Forestry, Pretoria (Tel. 012 336 7500).*

Assuming that access has been provided for a dipper, the next question is when to measure. The water level in a borehole drops when the pump is running, and "recovers" when the pump is not running. Whether or not the level recovers fully will depend on whether the well is being exploited at a sustainable rate, or not. If the borehole is being exploited within its sustainable yield, but only just, it may take several hours after the pump has been switched off before the water table recovers completely. If it is a very strongly yielding well that is being exploited at only a small fraction of its sustainable yield, then it will typically recover fully in less than an hour.

Therefore the water level one finds when checking a borehole will depend on whether the pump is on or off, and if off, then it will depend on whether it has been off for a few minutes or a few hours. If the borehole pump is controlled by a system which regulates pumping according to the state of the main reservoir (via a signal cable, or a pressure switch, or telemetry), then the pump will not be on at exactly the same times every day.

There are two possible ways to deal with the uncertainty in borehole water table monitoring. The one is to require the person doing the measuring to record simply whether the pump was on or off at the time of the measurement. As one will not know if the pump has been on or off for minutes or hours, one will expect to see a fairly wide spread in the data. With enough data one will be able to detect trends in the upper and lower limits of the readings, i.e. a data envelope should become apparent. If the upper and

lower limits of the envelope are level or stable, then it means that the borehole is being exploited sustainably. If, however, the upper and lower limits are dropping, then it means that the borehole is being exploited unsustainably and the pumping hours will need to be reduced.

The second option, and one which is preferable if one can afford it, is to have a remote monitoring system installed. Instrumentation is put in measuring whatever one is interested in (e.g. water level in the well and the flow through the water meter), and these readings are transmitted either via the cell phone network or via satellite to a receiver which is operated by the company which did the installation. With this equipment one can monitor the well from any internet connected computer anywhere. One can then not only see the detailed trend in the water level fluctuations, but one can see whether the pumps are running the expected number of hours per day. If they are not, for example if they are running 24 hours per day, then one knows that something has gone wrong with the pump control system (e.g. a burst rising main, a broken control valve at the reservoir, a broken signal cable, or faulty electronics in the pump control panel).

Umgeni Water has used a remote monitoring system to good effect on a critical borehole on the Maqumbi Water Supply Scheme. Figure 4 below shows how the level in this hole fluctuates over time, and from the data one can also deduce that at times the operator in the field has overridden the pump control system and caused the pump to run for several days. During this particular period one can see that recovery times are longer after long periods of pumping than they are after short periods of pumping, and one can also see that there is a steady downward trend in both the dynamic water level and the static water level.

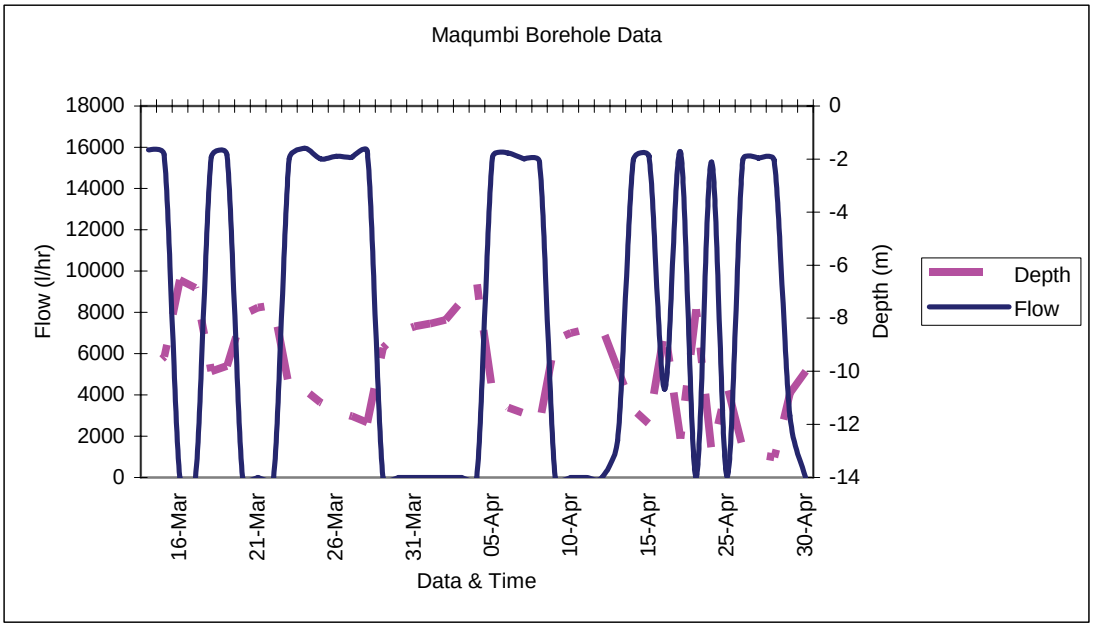


Figure 4: *Example of monitoring of borehole using remote sensing equipment (Maqumbi Borehole, Graham Metcalf, Umgeni Water, 2003)*

Note that in international reference works it is recommended that groundwater level monitoring is done using separate monitoring wells (i.e. *not* the wells in which the pumps are installed). In the context of rural water supply in South Africa, however, one very seldom if ever has the luxury of being able to afford to construct boreholes purely for monitoring purposes. A further difficulty in South Africa is that most boreholes are not located in primary aquifers, and therefore there would not necessarily be a direct link between the monitoring borehole and the production borehole.

4.3.1.4 Customer Satisfaction

A Key Performance Indicator which is often used in business is Customer Satisfaction. How can one measure this in the rural water supply context? Three methods can be used:

The percentage of customers who pay their bills is one proxy for customer satisfaction. If a customer feels he has not received the expected service, then he may choose to ignore or dispute the account. This is sometimes seen when water supply to an area is erratic or intermittent. However, in the rural water supply context in South Africa this indicator is no longer of much practical use as most people are no longer required to pay anything for their water supply. In fact, in many parts of the country, even before the introduction of the Free Basic Water policy, people received water whether they paid or not, and therefore the levels of payment were often very poor.

The second is to keep a log of customer complaints. The large Water Services Providers (e.g. Durban, Johannesburg) maintain 24 hour call centres with toll free numbers to ensure that customers can report problems as easily and quickly as possible. In rural water supply systems, however, the closest equivalent that can be offered is a complaint or fault log book. This would be kept at the water office (if there is one), or at the home of the water committee chairman (if there is one), or at the home of the local councillor (if he/she is mandated to deal with water, but depending on political relations between the District and Local Municipalities, this may not be the case). The KPI would reflect the number of complaints received per month, and should also include a measure of how long it takes, on average, to address a complaint.

The third method would be to undertake a customer survey. To ensure objectivity, this should ideally be done by someone other than those directly responsible for operating the water system. However, it is not likely that Water Services Providers will be able to afford to carry out customer satisfaction surveys very often. A crude proxy for such a survey, and one well understood in rural areas, is to hold a mass public meeting. Just how well this is attended, however, will depend on local politics and the effectiveness of the communication methods used to arrange the meeting.

4.3.1.5 Other data

Most other data can be summed up in a one or two page field report, similar to the one used by the ANDM support programme (see Appendix J). In the case of this work, the data capture was done on a one page report, which is shown in Appendix A.

4.3.2 Processing of data

4.3.2.1 The importance of time-based graphical information

When one is confronted by a page of numbers, in small print, the tendency is for one's mind to switch off. Unless one knows exactly what to look for, the eyes lose focus and see nothing in particular. However, when data is shown graphically, the eye can take in a whole sequence, with hundreds of data points, at a glance. For example, Figure 5 below shows the trend in Unaccounted for Water at Emayelisweni, measured as a percentage of the bulk water purchased. The graph shows over three years of information.

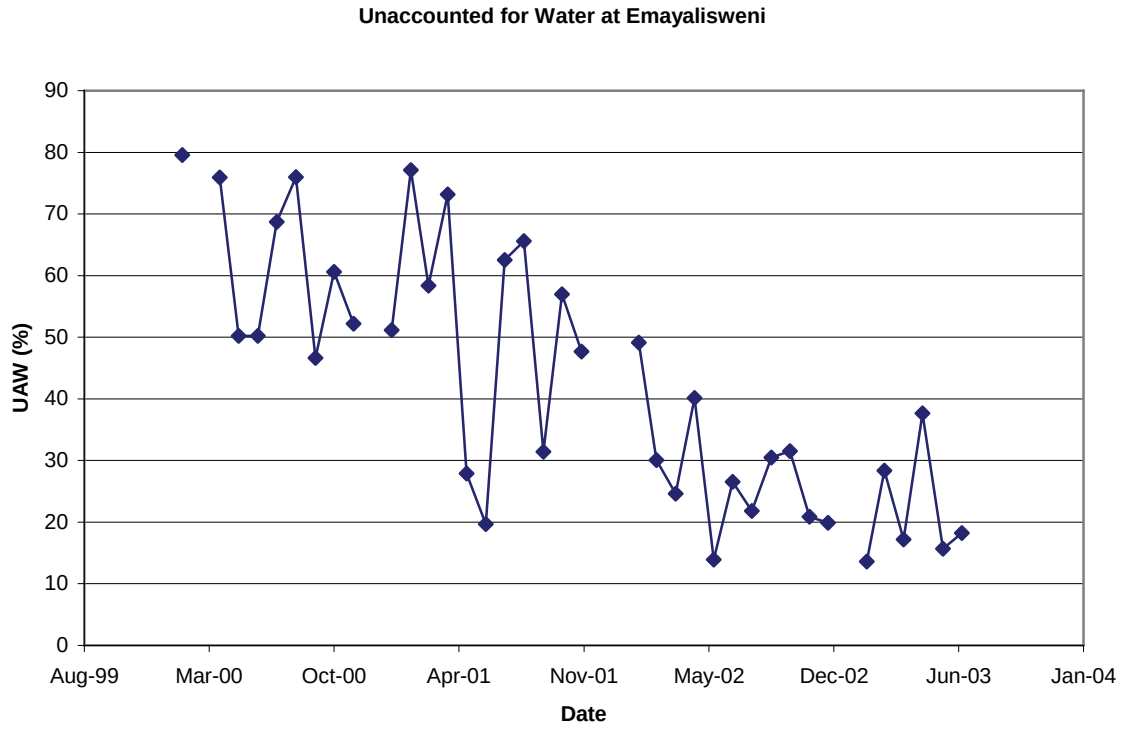


Figure 5: *Three year trend in Unaccounted-for Water at Emayelisweni*

During 2000 and much of 2001 the level of Unaccounted for water was very high, being between 50% and 80% of the total water supplied. In the second half of 2001 an intensive training and education programme was launched to motivate and enable the community water services provider to detect and address leaks in their system. This programme worked well, and by 2002/2003 the losses had reduced to between 15 and 35% of total water purchased. This programme has been described in a separate report, also to be published by the WRC, entitled *The Development of a Successful Unaccounted-for Water Management Programme in the Rural Water Supply Context* by Janet Ross-Jordan.

Thus the conversion of data into images enables the reader to absorb, at a glance, the *range* and the *trend* in a particular set of data. This is far more effective than a table of numbers.

4.3.3 KPI charting at community level

From the discussion in the section above it should be clear that data should be converted into images wherever possible. How can this be achieved at the level of community level staff, who seldom have the luxury of computers and printers with which to process data, assuming they had the skills to use them?

For the purposes of this project a standard charting sheet was developed. This sheet has twelve columns, to enable data to be recorded for each of the twelve months in a year. It has 20 rows, with no scale marked on the Y-Axis. The scale is worked out with the person responsible for charting in the field. For example, one might need to show the number of taps in the scheme, and for this one might need a scale of 0 to 50. On another sheet one might want to show income, and for this one might need a scale of 0 to 1000. On another sheet one might want to show supply reliability, and for this the scale would read from 0 to 100%.

Each chart can be given aids to interpretation, such as a red line to show that the boundary of an undesirable region, and a green line to show the boundary of a healthy region. This could be used for example if one was plotting costs per kilolitre of water supplied versus the tariff being charged or the subsidy being received.

The community clerk then uses wax crayons or koki pens to fill in the data month by month. The graph is displayed on a notice board in the water office, where it can be seen by all. If a number of the most important graphs are on the wall, the history and status of the water project can be taken in at a glance.

4.3.4 A spreadsheet based reporting system

During the year 2000 a fairly comprehensive Operations Reporting System was developed by David Stephen of Umgeni Water, in conjunction with DWAF and others working with Umgeni Water on the operation of RDP water schemes. An example of this has been reproduced in Appendix B.

That system has now been expanded and integrated with graphic KPIs. If a single A4 page data sheet can be completed at each month's water project WSA/WSP meeting, then this information (financial and technical) can be used to generate a full set of KPI graphs on computer. These can then be e-mailed by the person/agency responsible for supporting the scheme to any others interested in knowing how the scheme is functioning (e.g. the WSA manager). An example of what this graphical output might look like is shown in Appendix B, along with other aspects of that system. This reporting system was adopted by AquAmanzi (the KwaZulu-Natal BOTT contractor) to report on the operational status of its completed schemes during the period 2001 to 2003.

5. FINDINGS

5.1 Field Experience with Key Performance Indicators

The KPI system described in Section 4.2 above was introduced and tested on four community operated water supply schemes in KwaZulu-Natal. These were Nhlungwane, Esidumbini, Montebello and Emayelisweni. In each case the particular selection of KPIs which were recorded depended on the scheme administrator's aptitude and interests, as well as the particulars of that scheme, so there is some variability from scheme to scheme.

5.1.1 Nhlungwane

The Nhlungwane Water Scheme is located in the Msinga Local Municipality, which falls within the uMzinyathi District Municipality, KwaZulu-Natal. The project was implemented in 1997 by the Mvula Trust. Since its inception, the scheme has been managed by the local community. The scheme was built with a grant of R300 000 from the Department of Water Affairs and R24 000 contributed by members of the community. Water for the scheme is pumped from a borehole equipped with a submersible pump powered by a diesel generator. There are two separate rising mains, each filling two 30Kl reservoirs. The reticulation system supplies 40 standpipes serving 220 homes (approximately 1 500 people).

During the study period the scheme administrator kept charts showing the following indicators:

1. Number of families subscribing to the scheme
2. Scheme income
3. Scheme expenditure
4. Income – Expenditure (derived from 2 and 3)
5. Arrears Payments (amount of money owed in late payments)
6. Litres of diesel used per month
7. Cost of running the scheme in rands per family per month
8. Reliability of Supply

The quality of the supply was always good, and thus there was no interest in keeping track of this indicator. Summaries of some of the above data are included in Appendix L. The number of families subscribing to the scheme remained in the range of 208 to 220 over the period January 2000 to October 2003. The scheme's income was initially adequate, but as the price of diesel increased it eventually became insufficient. In July 1999 the community decided to increase the subscription rate from a flat R5/family/month to R7/family/month. From this point on the scheme has in general operated with a surplus, although that surplus has diminished with increasing energy costs. The litres of diesel used per month was initially constant at 140 litres per month, but increased to 175 litres per month during the period when problems were experienced with the leaking reservoirs. The cost of running the scheme was initially below R5/family per month, but has slowly increased to over R6/family per month. The reliability of the supply (see Figure 2 above) has been negatively affected during the period due to problems with

two of the bulk reservoirs. In spite of the relatively poor reliability during 2003, income has held up remarkably well.

The indicators proved to be a useful management tool. The committee found that they now had a better idea of what was happening on their scheme, and could see that they would before long have to discuss the need to increase the tariff from R7 per family to R8. One limitation in the case of Nhlungwane is that the scheme had no water office. This meant that all financial and management information had to be kept in files at the administrator's house. This meant that the information was not readily accessible, which detracts from the value of keeping indicators.

The scheme was visited by the District Municipality in 2003 with news that they would soon be taking over the scheme and introducing Free Basic Water, but by April 2005 this change had not yet taken effect.

5.1.2 Esidumbini

The Esidumbini Water Scheme is located in the Ndwedwe Local Municipality, which falls within the Ilembe District Municipality, KwaZulu-Natal. The project was implemented from 1995 to 1997 by the Port Natal-Ebhodwe Joint Services Board and its successor the Ilembe Regional Council. In 2002 and 2003 the scheme was extended and upgraded by AquAmanzi. The scheme was managed by the local community from 1997 until 2003, at which time it was taken over by the Ilembe District Municipality. The scheme was built with a grant of R4 400 000 and served 1 200 homes originally. Since its extension it serves 1 600 homes. Water for the scheme is extracted from an earth dam, treated using a slow sand filter, and then pumped, stored and reticulated through over 90 km of piping. The original project area is served via yard connections. The area to which the project was extended is served via public standpipes. The scheme has four (later increased to five) pumpstations, and as a result the cost of Eskom provision was an important indicator.

During the study period the scheme administrator kept charts showing the following indicators:

1. Cost of Eskom provision
2. Staff Wages
3. Total income (in receipts, rather than sales)
4. Number of Families Paying for Water
5. Expenditure
6. Month End Bank Balance - current
7. Month End Bank Balance - fixed call account
8. Money owed on account for pipe and fittings
9. Number of Connections

Summaries of some of the above data are included in Appendix L. The Eskom bills varied widely from month to month (from R2 000 to R8 000), which confused the committee greatly. It was found that the cause of this was a) that sometimes the committee's previous payment had been made after the deadline, which meant that the new account included the previous month's costs as well, and b) Eskom did not read the meters every month, but used estimates for two out of every three months. When the meters were read, an adjustment up or down was usually required.

The staff wages indicator was interesting, because this was adopted on the committee's own initiative without any prompting from the research team. This scheme had a relatively high monthly wage bill for a purely community managed project (averaging R6000 per month in the first six months of 2003). For this reason the administrator and the committee decided that staff wages would be a good indicator to keep tabs on.

Expenditure proved to be rather variable, from as little as R6 000 per month to almost R17 000 per month, but averaging around R10 000 per month. The reason for the variability was that in some months Eskom was not paid, and in others they were paid for two months at once.

Income proved to be as variable as expenditure, over much the same range. Most subscribers preferred to pay every few months rather than monthly, which would partly account for the variability. The other factor is that some of the income was deposits or payments for tap connections, rather than payments for water.

The number of yard connections on the scheme increased steadily at approximately 8 per month throughout the study period, from just under 600 in January 2001 to just under 800 in December 2002. It was particularly gratifying to witness this indicator being used. Prior to the introduction of the indicators, the scheme administrator struggled to answer the simple question, "How many taps are there on the scheme?". She would first spend fifteen minutes toiling over three or four different record books, and would then provide a tentative answer, which was sometimes wrong. Once the monthly updating and recording of the indicators had begun, she could answer the question easily at each monthly management meeting.

The indicators showing the scheme's bank balance were split into two – one for the current account and one for the call account. These indicators show that the project was losing money during the latter part of 2001, but from the beginning of 2002 its finances improved steadily. The reason for the improvement was that the management of the scheme, including the billing of customers and the collection of funds, improved during the latter period.

The Ilembe District Municipality was very positive about the state of the committee's administration when they took over the scheme in July 2003. The presence of the graphic KPIs, posted on notice boards in the water office, made a very positive positive impression in this regard.

5.1.3 Montebello

The Montebello Water Scheme is located in the Ndwedwe Local Municipality, which falls within the Ilembe District Municipality, KwaZulu-Natal. The project was implemented in 1996 and 1997 by the Ilembe Regional Council. The scheme was managed by the local community from 1997 until it was taken over by the Ilembe District Municipality in July 2003. The scheme was built with a grant of R1 500 000 and serves 2 500 people. Water for the scheme is extracted from a stream where it undergoes basic filtration, it is then chlorinated, pumped, stored and reticulated through over 24 km of piping. The community is served via yard connections.

During the study period the scheme administrator kept charts showing the following indicators:

1. Eskom cost
2. Receipts
3. Expenditure
4. Bulk Water Pumped
5. Water Sold
6. Month End Bank Balance
7. Month End Petty Cash Balance
8. Water Quality
9. Number of Connections
10. Losses (UAW)

Summaries of some of the above data are included in Appendix L.

The Eskom cost during the monitoring period was typically R1500/month. Income varied between R2000 and R5000 per month, and expenditure varied between R2200 and R3000 per month. Between 2000 and 3000 kl of water were pumped every month, and of this approximately 40% was sold – the balance was unaccounted for. A water loss management programme was undertaken in the latter half of 2001, and this brought losses down from an average of 75% before the programme to below 50% after the programme. The water quality acceptability ranged from 50% to 100%, with an average of 91%. The number of working yard connections in January 2001 was reported to be 160, and by April 2003 this had increased to 170.

As with Esidumbini, the Montebelllo scheme had a water office where the graphical KPI data was displayed on the wall for easy review. Unlike the other schemes included in this study, the Montebello scheme sold water to a neighbouring scheme (Emayelisweni).

5.1.4 Emayelisweni

The Emayelisweni Water Scheme is located in the Ndwedwe Local Municipality, which falls within the Ilembe District Municipality, KwaZulu-Natal. The project was implemented in 1997 and 1998 by Umgeni Water on behalf of the Ilembe Regional Council. The scheme was managed by the local community from 1998 until it was taken over by the Ilembe District Municipality in July 2003. The scheme was built with a grant of R500 000 and serves 700 people. Water for the scheme is supplied from the adjoining Montebello scheme. The community is served via yard connections.

During the study period the scheme administrator kept charts showing the following indicators:

1. Receipts
2. Expenditure
3. Bulk Water Purchased
4. Water Sold
5. Month End Bank Balance
6. Month End Petty Cash Balance
7. Debt on Bulk Water Account
8. Payment Arrears
9. Water Quality
10. Number of Connections
11. Losses (UAW)
12. Water Reliability

Summaries of some of the above data are included in Appendix L. At Emayelisweni an interesting phenomenon was the effect on the scheme's income of the annual Shembe pilgrimage, held in January every year. Whereas the typical monthly income amounted to between R500 and R900, in January the scheme was able to earn as much as R8000 selling water to the Shembe pilgrims. This sustained seasonal bonus would sustain the scheme through the rest of the year.

This scheme bought its water at R2.00/kl from the neighbouring Montebello scheme, and therefore any wastage was very expensive for them. Due to various minor problems going undetected and/or unattended to, the level of water loss in the scheme between January 2000 and April 2001 was ranging from 50% to 75%, which was crippling the scheme financially. After a concerted training and education program to reduce water losses, however, there was a steady and sustained improvement. By the second half of 2002 the losses were being managed at between 20% and 30% (Figure 5, which appears in Section 4.3.2.1, refers).

The experience with Unaccounted for Water (UAW) at Montebello and Emayelisweni has been written up into a stand alone report which will be published as a byproduct of this research. It may be of value to others trying to relate urban first world UAW software and hardware to rural water supply. A summary of this report appears in Appendix D.

5.2 Discussion – community level charting of KPIs

It was found that the more basic indicators, such as income, expenditure, cost of energy (Eskom or diesel) and number of taps, were easily taken up and recorded at community level. However, more complex indicators (e.g. quality, reliability and cost of sales) are understood only with repeated training. In this regard turnover of project staff is a problem. At each of the three Ilembe District Municipality projects where trials took place, the administrator changed at least once during the project period (and in one case twice in one year). In the four projects studied, during the period of this research, two of the administrators died from Aids. Both of them were intelligent young women in their twenties.

The “Accountability” indicators are not of interest to community level staff - these indicators can only be evaluated by staff external to the communities or projects under review (i.e. the WSA staff or their appointed agent). No attempt was made to keep these indicators.

On the whole the keeping and charting of indicators at community level was found to be achievable, and useful from a management perspective. With a longer term involvement in these projects, and with a mandate to train the administrators and to manage the schemes, it should be possible to gradually increase the scope and the complexity of the KPI system.

5.3 Benchmarks in Rural Water Supply

Since 1994 the South African government has made the eradication of the backlog in rural water supply one of its priorities. For the last five years the annual budget for the community water and sanitation programme has been in the region of a billion rands per year, and the number of people served is reported by DWAF to be in the region of a million per year. In order to gain an understanding of the characteristics of these projects one can compile a set of basic statistics, and then see where they differ, and where they are similar. With enough data one can also draw conclusions regarding variations between provinces. The data on which this section is based can be found in Appendix C.

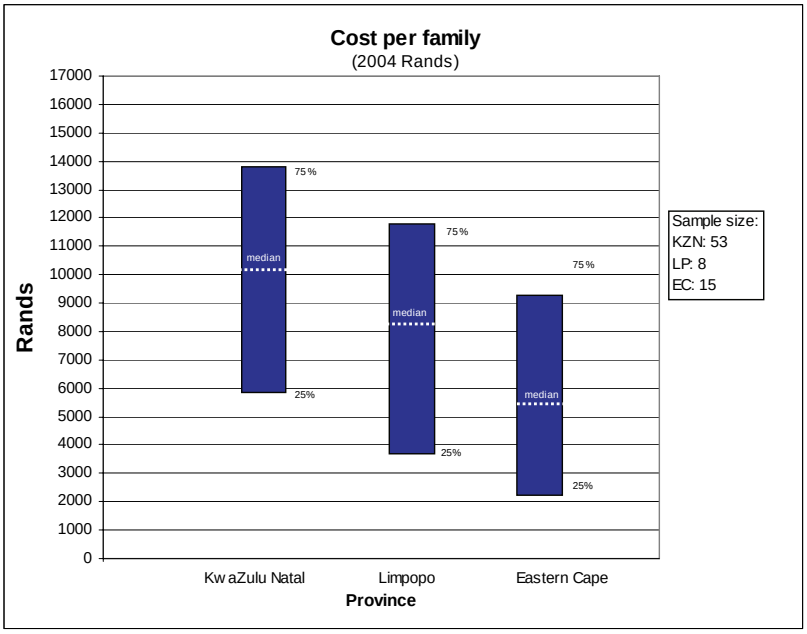
5.3.1 Capital cost per family served

Figure 6 shows the capital cost, per family served, of 86 water schemes of which 53 were in KwaZulu-Natal, 8 were in Limpopo province and 15 were in the Eastern Cape. These three provinces jointly account for the majority of rural people in South Africa, and in particular for the majority who are still without water.

Note that capital cost excludes the funds spent on operation, maintenance and mentorship after project completion. In some cases, where municipal capacity and willingness to take on projects has been limited, such support has gone on many years, and has cost a very significant amount of money. The number of families served should strictly only be those people who are within 500 m of a tap. If people live much further than that from the taps, they have not really been served, and certainly not at the RDP

standard of 200 metres. However, without detailed investigation, it is not possible to question the figures which are given on survey returns.

Figure 6: *Variation in capital cost per (rural) family served across three provinces (2004 rands). [The box shows the middle 50% of the data for each province. The full set of data can be viewed in Appendix C.].*



KwaZulu-Natal (with a median of R10 000 per family) has the most expensive water supply, principally due to its rugged terrain and to the dispersed settlement patterns of its rural people. The Eastern Cape and Limpopo province both have denser settlements, but the Eastern Cape people (at R5 500 per family) are less expensive to serve, probably because that province is better endowed with water resources, in particular in the form of high lying natural springs and streams.

Using the benchmarks in Figure 6 it is possible to make some broad estimates of the cost to eradicate South Africa's rural water supply backlog. Using a median supply cost of R8 000 per family (2004 rands), a backlog of 4.4 million people (DWAF, August 2004), an average rural family size of six, and escalating by 30% to allow for the time for completion, the capital cost will be approximately R7 billion. If, however, one uses the backlog figure of 11 million derived from DWAF's Free Basic Water website, and consequently allows for an escalation figure of 60% (because of the longer time for completion) then the capital cost will be in the order of R24 billion rands. In a reply to a question in parliament on the 17 August 2004 the minister in fact estimated that at the present rate of expenditure (R2.3 billion per annum), it would take seven years to clear the backlog in water supply, at current prices. Allowing for some escalation in prices, a figure of R20 billion seems about right to clear the water backlog.

5.3.2 Capital cost per public standpipe

Apart from capital cost it is instructive to look at the benchmark of capital cost per public standpipe provided. Although a public tapstand might itself only cost, say, R3 000 to construct, it works because of the whole system of infrastructure (water abstraction, purification, pumpstations, storage, bulk and secondary reticulation) which lies upstream. By dividing scheme cost by the number of public standpipes one arrives at a cost per public standpipe. The results are shown in Figure 7 below.

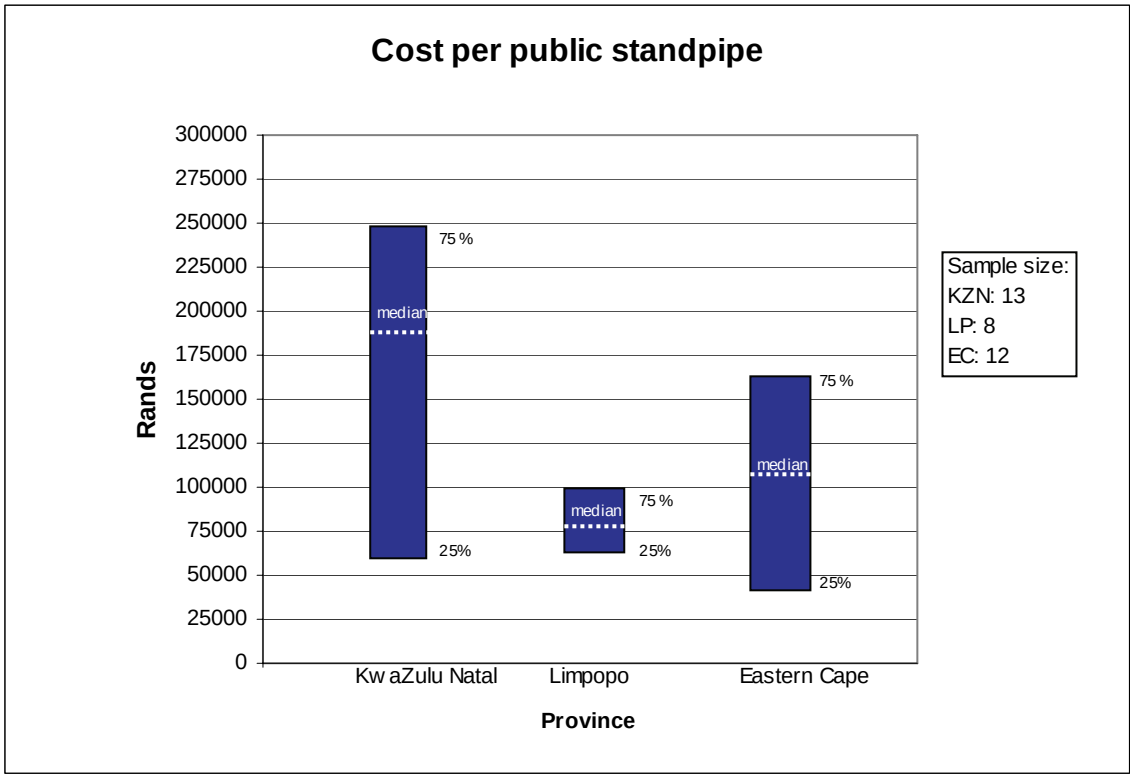


Figure 7: *Capital cost per public standpipe*

As be seen the cost of providing a public standpipe, when one takes the full scheme cost into context, is typically between R75 000 and R185 000, depending on which province one is in, with KwaZulu-Natal again being the most expensive. When one considers the typical cost of providing a handpump (R30 000 to R50 000, taking full programme costs into account), it is apparent that there is a high premium being paid for the higher level of service. This premium is offset if the piped scheme is later converted to yard connections, if this can be done without having to spend a large amount of money on upgrading.

5.3.3 Number of families served per tap

In some schemes, particularly when they are still in a relatively early stage of development, one might find it claimed that, say, 5000 families are served with 50 public standpipes. If that were so, then 100 families would be drawing water from each tap on a daily basis. But if one works out how long it will take to fill eight 25 litre containers (the Free Basic Water allowance), it cannot be done in under 20 minutes. That means that, in a ten hour day, no more than 30 families can be served from a tap at the FBW allowance. If people use half the FBW allowance, which is actually more typical when public standpipes are involved, then a maximum of 60 homes could be served by a public standpipe in a day. Figure 8 shows the number of families served per public standpipe on a number of rural water schemes in South Africa.

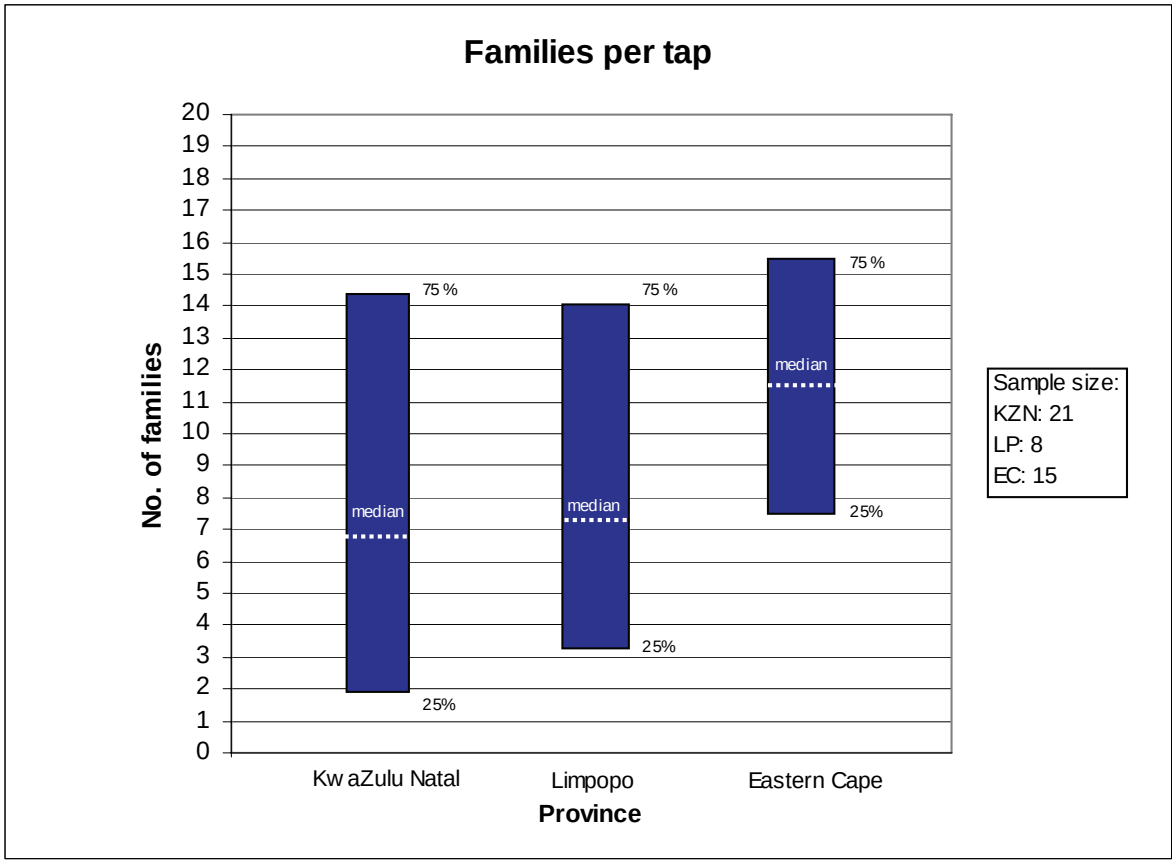


Figure 8: *Numbers of families served per public standpipe in a number of rural water schemes in KwaZulu-Natal, Limpopo and the Eastern Cape.*

The KZN median is just under seven, which is to be expected given the dispersed settlement patterns of the province. In the Eastern Cape a tap typically serves 11 to 12 families. Interestingly, in the schemes surveyed in the Limpopo province the numbers of families served per tap are very similar to those in KZN. Given the differences in settlement patterns, this implies that walking distances to taps in Limpopo are typically less than in KZN.

5.3.4 Length of piping per family served

Length of piping provided per family served is partly a function of settlement pattern (from very dense to highly dispersed). However, if this benchmark is compared between several schemes with the same settlement patterns, then it is more a measure of level of service. Figure 9 shows the variation in length of piping per family in a number of rural schemes in South Africa (in this case the 5 percentile and 95. percentile points have been included in the figure). While the median length of piping required per family is in the region of 40 metres for all three provinces surveyed, it is notable that the variation between schemes is significantly greater in KZN than it is in the other two provinces. This is a reflection of level of service. The KZN sample includes seven projects which are served predominantly with yard connections, and there is a wider variation in the number of families served per public standpipe than is found with the other two provinces. In the case of KZN it is possible that faulty data has generated the returns on some

schemes showing less than 20 and even 10 metres of piping per family, as this would scarcely be possible.

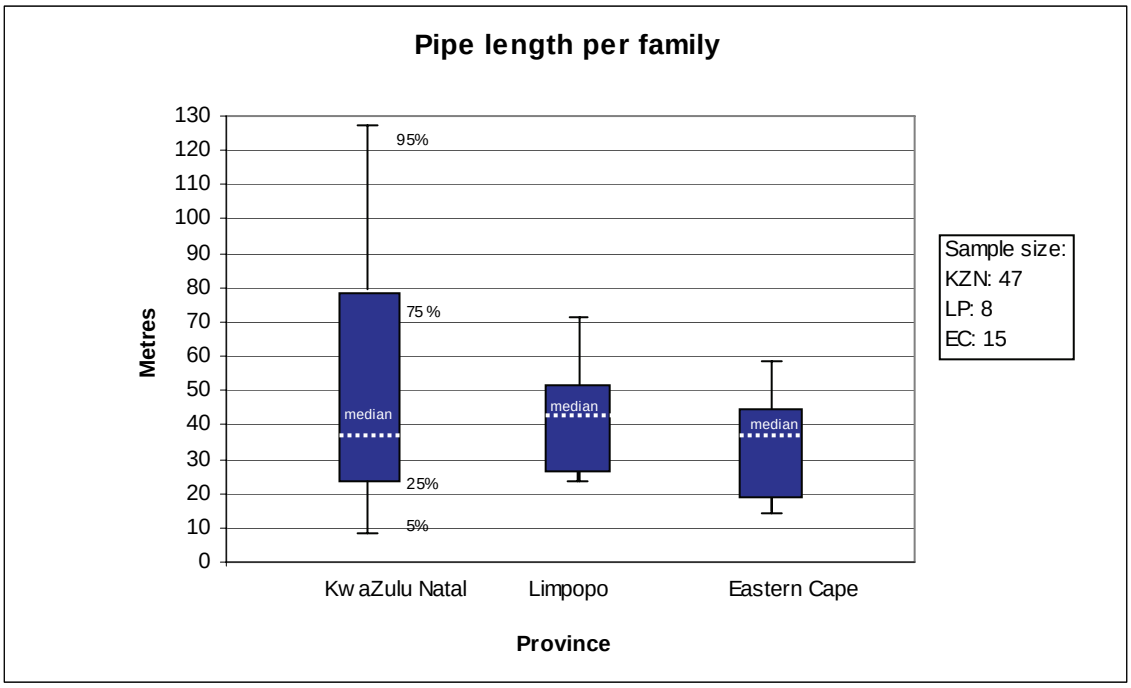


Figure 9: *Numbers of families served per public standpipe in a number of rural water schemes in KwaZulu-Natal, Limpopo and the Eastern Cape.*

5.3.5 Cost of operation and maintenance

Perhaps no benchmark is more important than the cost of operation and maintenance, for it is this cost that determines whether municipalities can afford to sustain rural water supplies once they have been provided.

In a WRC report titled “Free Basic Water Implementation in Rural areas” by Balfour *et al* (2005), nine case studies from the Eastern Cape and Kwa-Zulu Natal showed that this cost can be expected to be in the range from R3.00 to R6.00, and that there is a broad downward trend in operation and maintenance cost per capita in relation to scale of operation (see Figure 10).

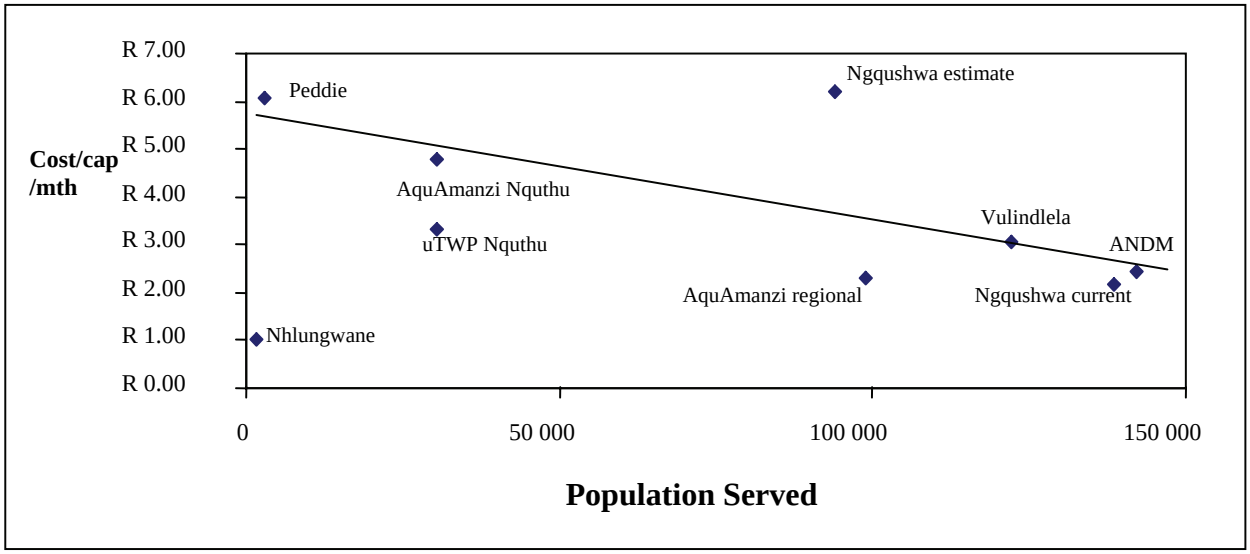


Figure 10: *Trend between operation and maintenance cost per capita and population served (from Balfour et al, WRC 2005). [The Ngqushwa current costs fit the trend but the service provided is apparently poor and needs significant improvement before it can be compared with the other costings. The Ngqushwa estimate is the cost believed to be required to provide services at an acceptable level].*

The Nhlungwane case study is interesting in that it is the only one included above in which the community was operating its own infrastructure without outside help. At R1/person served/month this is by far the cheapest of the cases reviewed. While truly successful community management of water schemes is not very common, this example does illustrate the economies that can be achieved.

It should be noted that none of the above case studies included provision for asset replacement in their costings. Asset replacement is, however, a critical item when one plans to keep a scheme in operation for more than ten years. The items that need replacing after approximately ten years include the pumps, motors, engines, switchgear, valves and meters. Items such as pipelines and reservoirs can remain useful for much longer, provided they are not undersized, that the population remains stable and provided they are made of durable materials. A good budget figure for asset replacement (in the absence of specific information) is R2 per person served per month (based on the assumption that 20% of the value of a typical scheme, costing R1200 per person, has to be replaced every ten years).

6. CONCLUSIONS

6.1 Importance of KPI initiatives

A number of studies have been undertaken, and are being undertaken, in South Africa regarding key performance indicators and benchmarks. Many of these relate either to large water utilities (supplying urban areas), or to the activities of higher level organisations such as Water Services Authorities. Two which relate to community water supply in particular are:

- The Council for Geoscience's Sustainability Indexing Tool (SusIT)
- The Alfred Nzo District Municipality's (ANDM) community water supply programme

The District Information Management System (DIMS), which was piloted by the uThungulu District Municipality, is potentially very useful because it is internet based and thus allows easy production of reports comparing data over whole districts, or over time.

In terms of actual KPI recording and benchmarking on the ground, however, the Alfred Nzo District Municipality's reporting system is the only one which has to date operated continuously in a real management situation at any significant scale. The system features multi-level reporting which provides an efficient system for senior management to track progress on schemes without overburdening them.

6.2 Community level KPI recording

At community level, systems of KPI recording are needed which are simple, practical and effective. In the course of this research a method of KPI recording at community level using standard data sheets and standard charts was tested. These sheets and charts are filled in by hand, which means that it is not essential to have computer facilities to do basic management. It was found that community level administrators could understand and work with this system, although only the simpler KPIs were tried out. With a longer term management commitment, there is no reason why more complex KPIs could not be tackled.

The KPIs that were successfully tested (income, expenditure, water losses, number of taps, energy bill etc) were found to be useful in understanding trends in the water schemes being managed.

6.3 Benchmarks

A set of basic yet fundamental benchmarks for rural water supply in South Africa was investigated, including the following:

- Capital cost per person served
- Capital cost per waterpoint (standpipe) provided
- Number of people served per standpipe
- Length of pipe laid per family
- Cost of operation and maintenance per person served

It was found that, in 2004 rands, the typical rural water project costs approximately R8 000 per family to build, although this varies considerably across three provinces surveyed (KwaZulu-Natal, Limpopo and Eastern Cape), and between projects within the provinces. Water supply is most expensive in KZN, and least expensive in the Eastern Cape. The reasons for the difference can be explained by differences in topography and settlement patterns. Depending on the real size of our water supply backlog, South Africa will need to spend somewhere between 7 and 24 billion rands before all have water.

When the capital cost of water projects is divided by the number of public standpipes, it is found that typically between R75 000 and R185 000 is spent for every water point. When one considers that the typical cost of handpumps is usually somewhere between R30 000 and R50 000, it is clear that a considerable premium is being paid for piped water.

While some instances were found where taps were expected to serve unrealistically large numbers of families, on typical projects there is a tap for every 7 to 12 homes (the lower figure being for KZN with its more spread out settlements, and the higher for the Eastern Cape).

No major difference was found in the length of piping used on typical projects across three provinces, but the variability was much higher in KZN than in Limpopo and the Eastern Cape. The median figure was 40 metres per family, with the range of the middle 50 percentile from 20 to 70 metres.

Operation and maintenance costs are typically in the range of R3 to R6 per person per month, although this does not take asset replacement into account.

7. RECOMMENDATIONS

The importance of community based management has decreased over the period during which this research has been undertaken. With the implementation of the Water Services Act (No. 108 of 1997), most municipalities are taking a direct hand in the operation and maintenance of their newly acquired water infrastructure. This is not a bad thing, in so far as municipalities are far better resourced than struggling rural communities. However, there are significant economies which are achieved when a rural community does manage to successfully operate and maintain its own scheme, as is illustrated by the example of Nhlungwane in Figure 9.

Regardless of who manages a water scheme, without the recording of key performance indicators over time, it is not possible to manage a water project effectively. At the very least these indicators should include the following:

- Reliability of service
- Quality of water supply
- Number of taps working

Ideally the indicators should also include items such as:

- Level of Unaccounted for Water
- Water consumption per person served
- Energy usage
- Water level in borehole or dam (where relevant)
- Staff costs
- Other costs
- Income (where relevant)
- Operating cost per unit of water supplied
- Operating cost per family served
- Average time taken to respond to fault reports
- Average time taken to make new connections
- Adequacy of stock on hand.

In order to convey the meaning of KPIs, they should be displayed graphically over time. By so doing, trends can be observed, and it can be deduced whether the scheme being observed is stable, getting worse or getting better. Even at the community level administrators should be taught how to record and plot simple but vital KPIs.

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www.dims.org.za

D. Personal Communication

Gibson, Jim of Maluti GMS, Matatiele

Perrit, Craig of Intermap, Pietermaritzburg

APPENDIX A

Samples of data collection sheets used during the KPI field research for this project

A1: Reliability Data Capture Sheet
A2: Water Quality Data Capture Sheet
A3: Summary Field Data Sheet

IS EVERYBODY GETTING WATER?

MONTH: MARCH.

KEY: –

write here the number of taps which are receiving water
write here the total number of taps in the scheme

TOTAL SCORE FOR MONTH

write here the total of all the top blocks
write here the total of all the bottom blocks

WEEK	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
One	43	43	43	43	43	43	43
	43	43	43	43	43	43	43
Two	43	38	38	38	38	43	43
	43	43	43	43	43	43	43
Three	43	0	0	0	0	0	0
	43	43	43	43	43	43	43
Four	0	43	43	43	43	43	43
	43	43	43	43	43	43	43
Five	25	43	43		TOTAL ACTUAL	994	75%
	43	43	43		TOTAL POSSIBLE	1333	

HOW IS THE WATER QUALITY?

KEY: –

colour green if the water looks good, else red	colour green if the water smells good, else red
colour green if the water tastes good, else red	colour green if the chlorinator is working OK, else red

MONTH: MARCH.

WEEK	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
One	X	✓	X	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Two	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Three	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	X	✓	X	✓	X	✓	X	✓	X	✓	X	✓	X
Four	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Five	✓	✓	✓	✓	✓	✓								
	✓	✓	✓	✓	✓	✓								

WATER QUALITY INDEX FOR MARCH = $\frac{\text{21 days with good water quality} \times 100}{\text{31 days in the month}} = 68\%$

NOTE: A day is discounted if any one, or more, of the four quality indicators is not acceptable.

MONTHLY REPORTING DATA

PROJECT NAME:		**RECORD DATE:**	
	MONTH:		

Bulk meter readings		**Water consumption**	
1. Date of bulk meter reading		6. Water consumption - total of all individual meter readings	
2. Bulk meter reading this month		7. Value of water sales for the month (ie. Total of invoices to those with taps)	*R*
3. Date of last bulk meter reading		8. Water consumption per household (ie. Total water consumption divided by number of working taps)	
4. Last bulk meter reading			
5. Bulk water used		9. Date of individual meter readings	

Water reliability		**Tap connections**	
10. How many days in the last month was water received?	*days*	15. How many homes were waiting for taps at the beginning of the period?	*homes*
11. How many days was the water quality acceptable?	*days*	16. How many homes were waiting for taps at the end of the period?	*homes*
13. Was there any vandalism during this month?		27. How many new applications for taps were made in the period (only count if the application is accompanied by a full payment)	
14. If so, please describe:		18. How many taps are in the scheme?	*taps*

Financial report

19. Record all income for the month, with a breakdown:		20. Record all expenditure for the month, with a	
	R		*R*
	R		*R*
	R		*R*
	R		*R*
	R		*R*
	R		*R*
	R		*R*
	R		*R*
Total	*R*	Total	*R*

21. What was the bank balance at the end of the month?	*R*	22. Record debts which the committee might have, with a breakdown:	
			R
			R
			R
			R
			R
		Total	*R*

Summary indicators

23. Reliability of the scheme as per KPI log sheet	%	24. Water quality in the scheme as per KPI log sheet	%
25. Water Losses as per KPI log sheet	%	26. Cost of water per kilolitre (ie. Total current expenditure and debt divided by bulk volume used)	*R/Kl*

A4

IMININGWANE YOMBIKO WANYANGA ZONKE

IGAMA LEPROJECT: ZIMISELENI HQ PROJECT
INYANGA: NOVEMBER
USUKU LERECORD: 30 DEC. 02

Ukufundwa kwemitha elikhulu

1. Usuku lokufundwa kwemitha elikhulu	24.11.02
2. Ukufundwa kwemitha elikhulu kulenyanga	
3. Usuku lokufundwa lwemitha elikhulu okudlule	
4. Ukufundwa kwemitha elikhulu okudlule	24.10.02
5. Amanzi adlulile emitheni elikhulu (amanzi aphampiwe)	

Amanzi adliwe

6. Amanzi adliwe - amamitha angaphakathi ehlangene	781.72
7. Bhala phansi imali yamanzi athengisiwe enyangeni (okungukuthi, isamba sama-invoice aphumile ayakulabo abasebenzisa ompompi)	R 3175.42c
8. Amanzi adliwe ngumuzi ngamunye (okungu kuthi, isamba sama nzi adliwe kuhluka niswe neneni lompo mpi abasebenza yo)	
9. Usuku lokufundwa kwamamitha angaphakathi	25 - 30

Ukuthembeka kokutholakale kwamanzi

10. Zingaki izinsuku enyangeni edlule amanzi abetholakala ngazo?	30 izinsuku
11. Zingaki izinsuku lapho izinga lamanzi beligculisa khona?	30 izinsuku
12. Ingabe kuke kwabakhona ukucekelwa phansi kulenyanga?	Cha
13. Uma kuke kwabakhona chaza:	

Ukufakelwa kompompi

14. Bangaki abantu abebelindele ukufakelwa ompompi ekuqaleni kwalenyanga?	- imizi
15. Bangaki abantu abebelindele ukufakelwa ompompi ekupheleni kwalenyanga?	- imizi
16. Bangaki abantu abafake izicelo zokufakelwa ompompi kulenyanga (bala kuphela labo izicelo zabo ezihambisana nemali ephelele)	
17. Bangaki ompompi abakhona kulomsebenzi?	163 umpompi

Umbiko wezemali

18. Bhala phansi yonke imali engenile kulenyanga uyihlukanise		19. Bhala phansi zonke izimali ezisetshenziswe kulenyanga uyihlukanise	
MTB HOSTEL (DEPOSIT)	R 928.00	ESKOM	R1549.92c
MAYELESWENI	R -	WAGES	R640.00
MTB. COMMUNITY	R2218.91c	INVOICES	R 39.98
	R	TRANSPORT	R 20.00
	R	PAYMENT FOR ESKOM (TRANSPORT)	R 30.00
	R	DEPOSITOR (TRANSPORT)	R 30.00
	R	LOOKING FOR POSI (TRANSPORT)	R 30.00
	R		R
Isamba	R3146.91	Isamba	R2359.90

20. Ibingakanani imali ebikhona ebhange ekuqaleni kwalenyanga?	R~~5202.85~~	21. Bhala phansi zonke izikweletu ikomidi elinazo ezingakakhokhwa, ukihlukanise.	
		ESKOM	R1509.54c
			R
			R
			R
			R
		Isamba	R1509.54

Ukufinqwa kwezinto bangqala

22. Ukuthembeka komsebenzi nye ngalokhu kuchazwa yizinkomba ngqala zokusebenza ezibhalwe kwi log-sheet	%	23. Uhlobo lwamanzi atholakala zkulomse benzi njengokwezinkomba ngqala zokusebenza ezibhalwe log-sheet	50 %
24. Amanzi alahlekile njengenkomba ngqala ebhalwe kwi log-sheet	50 %	25. Izindleko zamanzi ngokwe khilolitha, (okungukuthi isamba sezindleko zalenyanga kanye nezikwelelu kuhlukaniswe ngamanzi aphume elhangani elikhulu)	R/Kl

APPENDIX B

Example of input and output from modified Umgeni Water RDP Operations Reporting Format

B1

MONTHLY O & M REPORT - OVERALL PROJECT STATUS — **Reporting Month:** Apr-03

PROJECT NAME: EMAYELISWENI/MTB — DWAF PROJECT CODE: 02KN024 (old) — KN022 (new)

Regional Council: iLembe — NOTE: All Rand-values include VAT

Brief Description: Water is abstracted from a weir across the Mdloti River, and pumped through two stages to a 25 kl transfer reservoir. The water is chlorinated there and then flows under gravity into two 100 kl reservoirs. From the bulk storage the water gravitates to feed 190 metered private standpipes.

Length of Piping (as built): 34

Capital Cost (Actual to date)
Phase 1: R 2,067,000 R1284000 co-funded by Ilembe
Phase 2 (cumulative): R -
Further phases (cumulative):

Design Population (as per BP)
Phase 1: 2720
Phase 2 (cumulative): 0
Further phases (cumulative): 0

Commissioning date: Jun-98
TTP Commencement date: Feb-00

Sustainable Yield of Source (kl/d): 800 — Source type: River Abstraction
Treatment Capacity (kl/d): 400 Based on max. 16 hours/day operation
Pumping Capacity (kl/d): 233 Based on max. 16 hrs/day electric or 10 hrs/day diesel
Pipeline Capacity (kl/d): 457 Limited to 1,5 m/s velocity in key supply link(s)
Current Limiting Scheme Capacity (minimum of above): 233 kl/d

Age (months in operation): 59
Age (months in TTP): 39

Legend of Colour Coding
Information that remains constant
Information that changes occasionally
Information from Input Data Sheet
Information to be provided monthly
Information calculated by spreadsheet

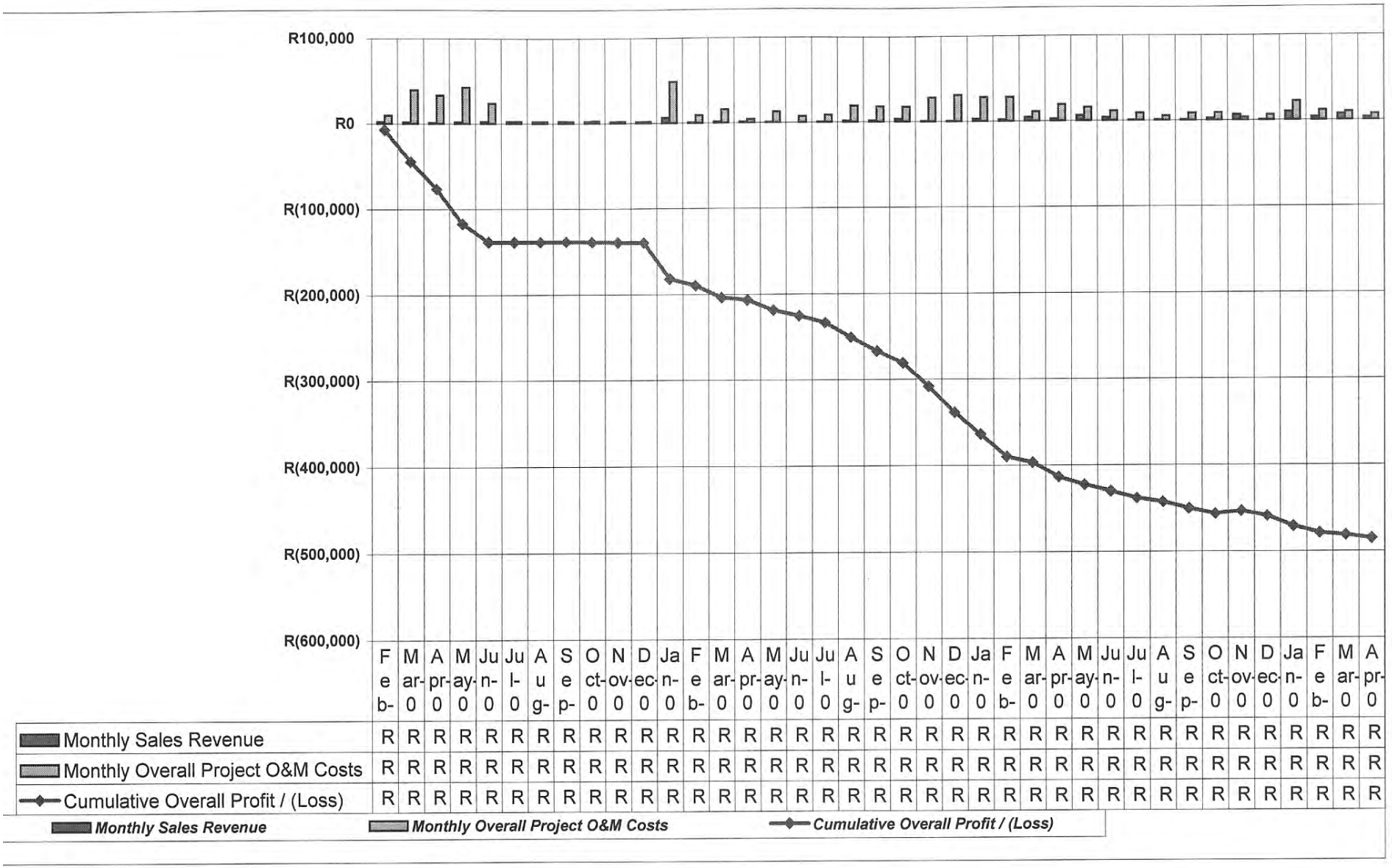
Buy-in Tariff (R / kl) (incl. VAT) *Only if applicable*: R0.00 — 0
Communal Standpipe Tariff (R / kl) (incl. VAT): R4.00
Yard/House Connection Tariff (R / kl) (incl. VAT): R4.00
Institutional Connection Tariff (R / kl) (incl. VAT): R4.00

	Item	Monthly Target	Accumulated previous	This month	Total to date	Average to date	Comments
Financial	Overheads	R 480	R 32,459	R 2,000	R 34,459	R 884	
	Repairs & maintenance	R 400	R 125,418	R -	R 125,418	R 3,216	
	Buy-in or Production Cost	R 1,200	R 67,342	R 1,500	R 68,842	R 1,765	
	Support & Mentoring cost	R 6,000	R 357,499	R 5,000	R 362,499	R 9,295	
	Total O&M Expenditure	**R 8,080**	R 582,718	R 8,500	R 591,218	R 15,159	
	Water Sales Revenue	R 5,000	R 96,309	R 5,000	R 101,309	R 2,598	
	Other Income	R -	R -	R -	R -	R -	
	Profit / (Loss)	R (3,080)	R (486,409)	R (3,500)	R (489,909)	R (12,562)	
	Unit cost of water (R/kl)	R 6.46	R 21.97	R 9.44	N/A	R 21.56	
Volumes	Bulk Supply, Buy-in or Production Volume (kl / mth)	1800.0	91452.0	2,700.0	94152.0	2414.2	
	% of Limiting Scheme Capacity	25.4%	34.0%	38.1%	N/A	34.1%	
	Metered Volume at Communal Standpipes (kl / mth)	0.0	0.0	0.0	0.0	0	
	Metered Volume at Yard / House Connections (kl / mth)	750.0	25995.1	900.0	26895.1	689.6	
	Metered Volume at Institutional Connections (kl / mth)	500.0	530.0	0.0	530.0	13.6	
	Total metered volume at all connections (kl / mth)	1250.0	26525.1	900.0	27425.1	703.2	
Losses	Unavoidable Losses (kl / mth)	120.0	2200.0	200.0	2400.0	61.5	
	Adjusted Bulk Supply, Buy-in or Production Volume (kl / mth)	1680.0	17389.0	2500.0	19889.0	510	
	Unaccounted for water (kl / mth)	430.0	-9136.1	1600.0	-7536.1	-193.2	
	UFW as a percentage of adjusted bulk supply (L(abs) %)	25.6%	-52.5%	64.0%	N/A	-37.9%	Zonal check meters now being installed to assist with loss reduction
	Equivalent Volume Sold at all connections (i.e. Sales/Tariff) (kl)	1250.0	6943.1	1500.0	8443.1	216.5	
	Value of Loss of Water Sales Revenue	R 1,720	R 41,784	R 4,000	R 45,784	R 1,174	
Service Level	Number of working taps in the system		208	208	416	N/A	
	Average number supplied by each tap		10	10	20	N/A	
	Total number of people being supplied		0.0	N/A	N/A	0.0	
	Water consumption (litres/person/day)			0	0	N/A	
Quality & Supply	No. of Days Quality Not Satisfactory		21	6	27	1	Filter and flocculator donated by Aquamat to be installed in March
	Service Interruptions (supply-point days)		5720	1000	6720	172	Problems experienced with pumps in December - one motor replaced, and pump intake chamber cleaned and modified
	Percentage availability of water supply at supply points		97.8%	84.2%	N/A	98.6%	See above
	Incidents of Vandalism		6	0	6	0.2	

Employment	Categories	Male	Female	Disabled	Total	
	Permanent				0	Current month
	Part Time	4	2		6	Current month
	Value of Wages (R / month)	R 700	R 600		R 1,300	Current month

DWAF O&M Report Format Revised: 10 August 2000

Overall Project Graph Chart 3



MONTHLY O & M REPORT - LOCAL WATER COMMITTEE STATUS

Reporting Month: Apr-03

PROJECT : EMAYELISWENI/MTB DWAF PROJECT CODE: 02KN024 (old) KN022 (new)

Regional Council : iLembe **NOTE: All Rand-values include VAT**

Brief Description :	Water is abstracted from a weir across the Mdloti River, and pumped through two stages to a 25 kl transfer reservoir. The water is chlorinated there and then flows under gravity into two 100 kl reservoirs. From the bulk storage the water gravitates to feed 190 metered private standpipes.

Length of Piping (as built): 34

Capital Cost (Actual to date)
- Phase 1: R 2,067,000
- Phase 2 (cumulative): R -
- Further phases (cumulative): R -

Design Population (as per BP)
- Phase 1: 2720
- Phase 2 (cumulative): 0
- Further phases (cumulative): 0

Commissioning date: Jun-98

TTP Commencement date: Feb-00

Sustainable Yield of Source (kl/d): 800 Source type: River Abstraction

Treatment Capacity (kl/d): 400 Based on max. 16 hours/day operation

Pumping Capacity (kl/d): 233 Based on max. 16 hrs/day electric or 10 hrs/day diesel

Pipeline Capacity (kl/d): 457 Limited to 1,5 m/s velocity in key supply link(s)

Current Limiting Scheme Capacity (minimum of above): 233

Age (months in operation): 59

Age (months in TTP): 39

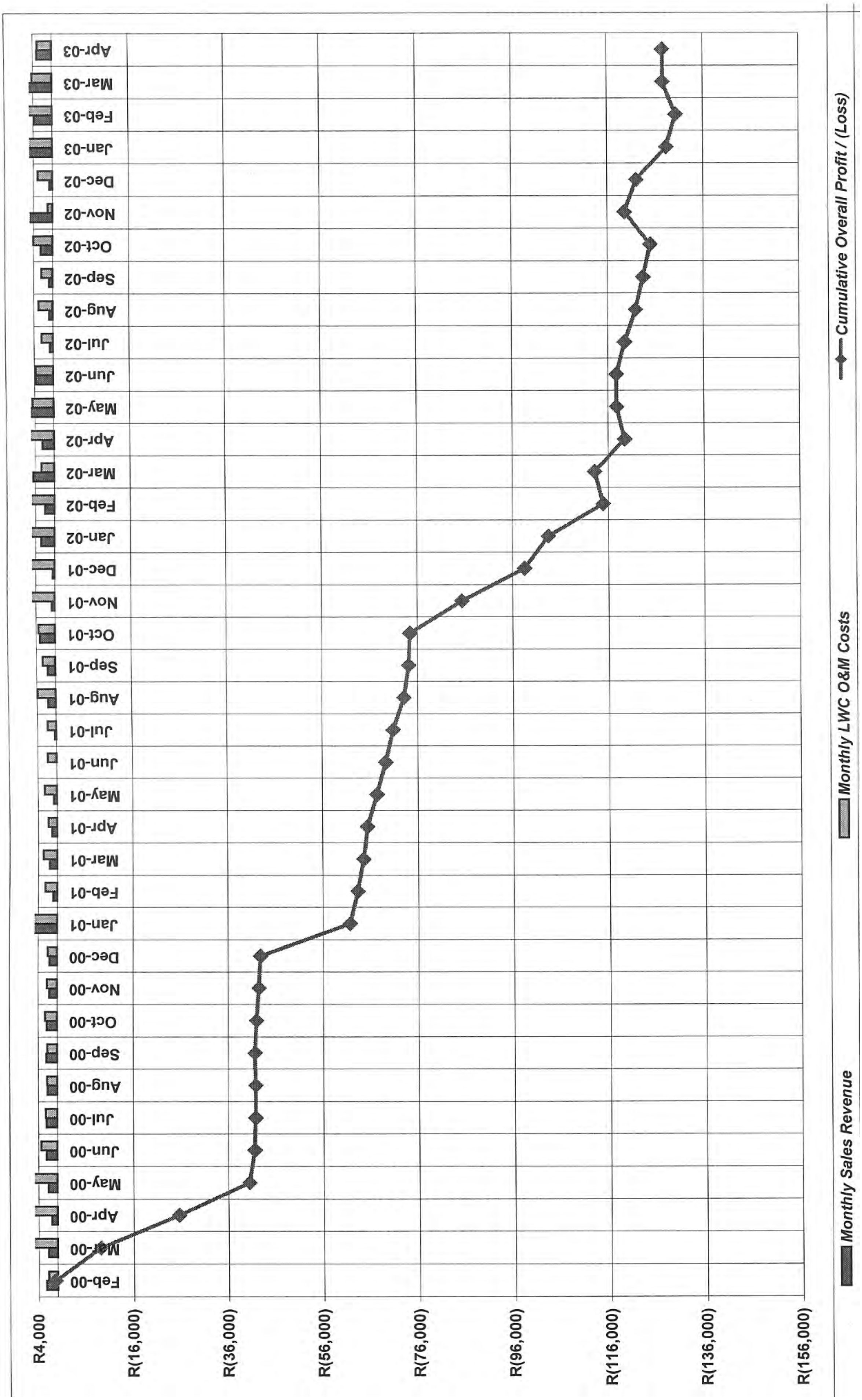
Legend of Colour Coding
Information that remains constant
Information that changes occasionally
Information from Input Data Sheet
Information to be provided monthly
Information calculated by spreadsheet

Buy-in Tariff (R / kl) (incl. VAT) ***Only if applicable***	Communal Standpipe Tariff (R / kl) (incl. VAT)	Yard/House Connection Tariff (R / kl) (incl. VAT)	Institutional Connection Tariff (R / kl) (incl. VAT)
R0.00	R4.00	R4.00	R4.00

	Item	Monthly Target	Accumulated previous	This month	Total to date	Average to date	Comments
Financial	Overheads	R 480	R 32,459	R 2,000	R 34,459	R 884	
	Repairs & maintenance	R 400	R 125,418	R -	R 125,418	R 3,216	
	Buy-in or Production Cost	R 1,200	R 67,342	R 1,500	R 68,842	R 1,765	
	Total O&M Expenditure	**R 2,080**	R 225,219	R 3,500	**R 228,719**	**R 5,865**	
	Water Sales Revenue	**R 5,000**	R 96,309	R 5,000	**R 101,309**	**R 2,598**	
	Other Income	R -	R -	R -	R -	R -	
	Profit / (Loss)	**R 2,920**	R (128,909)	R 1,500	**R (127,409)**	**R (3,267)**	
	Unit cost of water (R/kl)	**R 1.66**	R 8.49	R 3.89	N/A	**R 8.34**	
Volumes	Bulk Supply, Buy-in or Production Volume (kl / mth)	1800.0	91452.0	2,700.0	94152.0	2414.2	
	% of Limiting Scheme Capacity	25.4%	34.0%	38.1%	N/A	34.1%	
	Metered Volume at Communal Standpipes (kl / mth)	0.0	0.0	0.0	0.0	0	
	Metered Volume at Yard / House Connections (kl / mth)	750.0	25995.1	900.0	26895.1	689.6	
	Metered Volume at Institutional Connections (kl / mth)	500.0	530.0	0.0	530.0	13.6	
	Total metered volume at all connections (kl / mth)	**1250.0**	**26525.1**	**900.0**	**27425.1**	**703.2**	
Losses	Unavoidable Losses (kl / mth)	120.0	2200.0	200.0	2400.0	61.5	
	Adjusted Bulk Supply, Buy-in or Production Volume (kl / mth)	1680.0	17389.0	2500.0	19889.0	510	
	Unaccounted for water (kl / mth)	430.0	-9136.1	1600.0	-7536.1	-193.2	
	UFW as a percentage of adjusted bulk supply (L(abs) %)	25.6%	-52.5%	64.0%	N/A	-37.9%	
	Equivalent Volume Sold at all connections (i.e. Sales/Tariff) (kl)	1250.0	6943.1	174.1	7117.2	182.5	
	Value of Loss of Water Sales Revenue	R 1,720	R 41,784	R 9,304	R 51,087	R 1,310	
Population Served	No. of Communal Standpipes		208	208	416	N/A	
	Estimated population served at Communal Standpipes		10	#REF!	#REF!	N/A	
	Unit consumption at Communal Standpipes (litres/person/day)		0.0	N/A	N/A	#REF!	
	No.of Yard/House Connections		0	0	0	N/A	
	Estimated population served at Yard/House Connections		#REF!	#REF!	#REF!	N/A	
	Unit consumption at Yard/House Connections (litres/person/day)		#DIV/0!	N/A	N/A		
	No. of Institutional Connections		#REF!	#REF!	#REF!	N/A	
	Estimated Total Population Served		**#REF!**	**#REF!**	**#REF!**	N/A	
	Overall Unit Consumption (litres/person/day)		**#REF!**	**#REF!**	N/A	**#REF!**	
Quality & Supply	No. of Days Quality Not Satisfactory		21	6	27	1	Based on consumer's satisfaction with appearance, taste and odour of a sample drawn daily at a selected point
	Service Interruptions (supply-point days)		5720	1000	6720	172	
	Percentage availability of water supply at supply points		#REF!	#REF!	N/A	#REF!	
	Incidents of Vandalism		6	0	6	0.2	

Employment	Categories	Male	Female	Disabled	Total	
	Permanent	0		0	0	Current month
	Part Time	4	2	0	6	Current month
	Value of Wages (R / month)	R 700	R 600	R 0	R 1,300	Current month

DWAF O&M Report Format Revised: 10 August 2000



R4,000
R(16,000)
R(36,000)
R(56,000)
R(76,000)
R(96,000)
R(116,000)
R(136,000)
R(156,000)
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
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Sep-00
Oct-00
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Feb-01
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May-02
Jun-02
Jul-02
Aug-02
Sep-02
Oct-02
Nov-02
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
Monthly Sales Revenue
Monthly LWC O&M Costs
Cumulative Overall Profit / (Loss)

MONTHLY O & M REPORT - FINANCIAL INPUT DATA SHEET

EMAYELISWENI/MTB

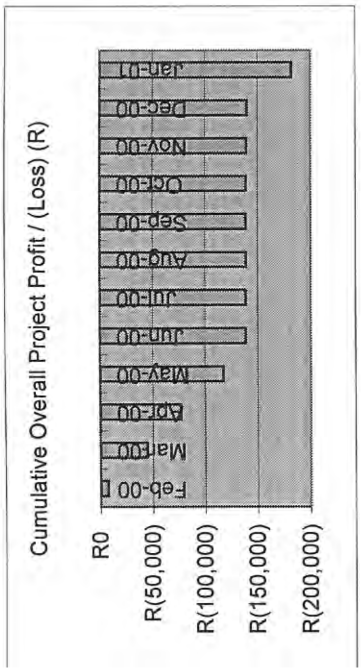
Reporting Month: Apr-03

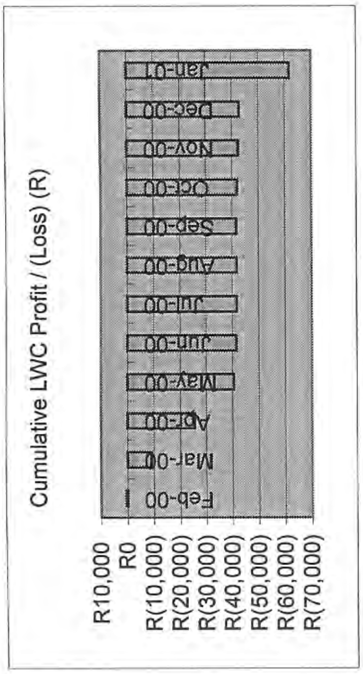
NOTE: All Rand-values include VAT

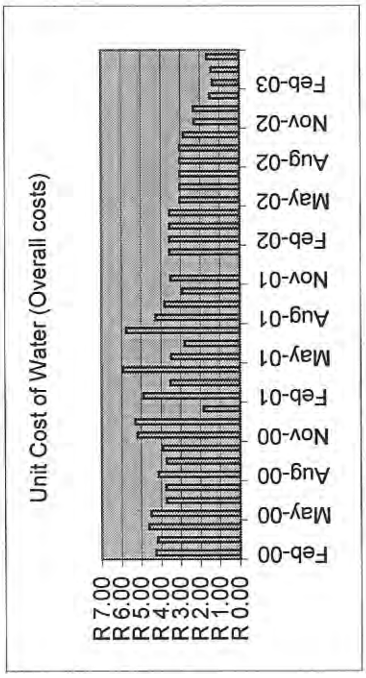
	Code	Category / Code / Description			Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01
Overheads	Oa	Office staff wages	R	13,220	R 200	R 200	R 130	R 100	R 350	R 620	R 300	R 300	R 300	R 350	R 300	R 300
	Ob	Field staff wages	R	14,386		R 165	R 30	R 30	R 195	R 280	R 180	R 180	R 180	R 180	R 150	R 2,000
	Oc	LWC allowances	R	157	R 20	R 44										R 74
	Od	Security guard's wages	R	-												
	Oe	Bank charges, telephone, taxi fares	R	61		R 15										
	Of	Stationery and computer consumables	R	3,218	R 157	R 282	R 103	R 81	R 266	R 56	R 41	R 10	R 84			R -
	Og	Water Office electricity costs	R	-												R -
	Oh	Insurance premiums and licence costs	R	-												
	Oi	Vehicle costs	R	1,417	R 20	R 178	R 10	R 10	R 264		R 15	R 32	R 39	R 24		
	Op	Cost of Public or Private Connections	R	-												
	Ot	Cost of Pre-Paid Tokens	R	-												
R&M	Rl	Repairs and maintenance - Local labour costs	R	8,283		R 581	R 495	R 490	R 57	R -	R 90	R 90	R 440	R 60		R 450
	Rm	Repairs and maintenance - Material costs	R	59,983		R 1,593	R 6,914	R 7,584	R 406							R 14,297
	Ro	Repairs and maintenance - Outsourced work	R	57,032		R 6,823	R 8,477	R 6,864	R 354							
	Rp	Repairs and maintenance - Plant costs	R	120												
	Rw	Repairs and maintenance - Water Dispensing Units	R	-												
Prod'n	Pb	Buy-in Cost	R	6,208	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R 6,208
	Pc	Production Cost - Chemicals	R	86		R 63			R 23							R 1,707
	Pe	Production Cost - Energy (Electricity/Diesel)	R	61,048	R 1,500	R 1,500	R 1,500	R 1,539	R 1,500	R 1,500	R 1,500	R 1,500	R 1,500	R 1,500	R 1,500	R 1,500
	Pl	Production Cost - Labour	R	-												
		Total LWC O & M Costs	R	225,219	R 1,897	R 11,445	R 17,648	R 16,698	R 3,415	R 2,456	R 2,126	R 2,112	R 2,543	R 2,144	R 1,950	R 25,035
Total Accruals		Amount Paid			R 1,897	R 11,445	R 17,648	R 16,698	R 3,415	R 2,456	R 2,126	R 2,112	R 2,543	R 2,144	R 1,950	R 18,827
		Balance	R	225,219	R 0	R -0	R 0	R -0	R 0	R -0	R -0	R -0	R -0	R -	R -	R 6,208
		Cumulative Accruals		N/A	R 0	R -0	R -0	R -0	R -0	R -0	R -0	R -0	R -1	R -1	R -1	R 6,207
Support&Mentoring	Sb	Support & Mentoring Cost - Bulk Supply (Net Cost)	R	130,658		R 12,807	R 4,802	R 3,694							R -	R 7,402
	Se	Support & Mentoring Cost - Environmental Management	R	-												
	Sf	Support & Mentoring Cost - Facilitation	R	34,491	R 3,000	R 3,000	R 3,000	R 3,000	R 3,000	R -	R -	R -	R -	R -	R -	
	Si	Support & Mentoring Cost - Implementing Agents' costs	R	-												
	Sp	Support & Mentoring Cost - Project Management	R	74,333		R 6,775	R 2,938	R 2,457	R 5,547	R -	R -	R -	R -	R -	R -	R 6,484
	Sq	Support & Mentoring Cost - Water Quality Monitoring Programme	R	6,371		R 479	R 2,428	R 559								R 1,293
	Sr	Support & Mentoring Cost - Reticulation Supply	R	56,512	R 1,736	R 1,736	R 1,140	R 1,388	R 1,121	R -						R 4,000
	St	Support & Mentoring Cost - Training	R	55,135	R 3,000	R 3,118	R 1,618	R 14,748	R 10,562	R -	R -	R -	R -	R -	R -	R 2,082
		Total Project O&M Costs R 582,718	R	582,718	R 9,633	R 39,360	R 32,974	R 42,523	R 23,646	R 2,456	R 2,126	R 2,112	R 2,543	R 2,144	R 1,950	R 48,296
Water Sales Revenue		Basic Monthly Charge or Flat-Rate (if applicable) (R)	R	-												
		Gross Sales Revenue from Communal Standpipes (R)	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -
		Gross Sales Revenue from Yard/House Connections (R)	R	66,012	R 2,332	R 1,923	R 1,117	R 1,885	R 2,291	R 2,271	R 2,059	R 2,285	R 2,174	R 1,639	R 1,600	R 1,196
		Gross Sales Revenue from Institutional Connections (R)	R	30,297	0	0	0	0	0	0	0	0	0			5000
Other Income		Membership or Registration fees	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -			
		Income from private connections	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -			
		Income from sale of tokens (applicable to Pre-Paid System)	R	-												
		Interest received	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -			
		Other income	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -			
		Subsidies & Donations received	R	-	R -	R -	R -	R -	R -	R -	R -	R -	R -			

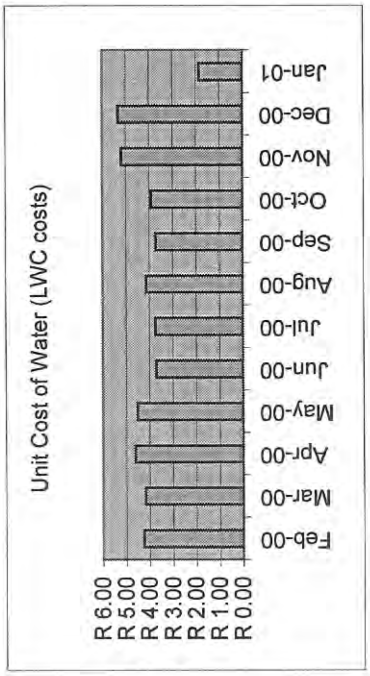
Cash received and Arrears			
	Basic Monthly Charge or Flat-Rate (if applicable) (R)	Cash received	
		Arrears	
	Communal Standpipes (R)	Cash received	
		Arrears	
	Yard/House Connections (R)	Cash received	
		Arrears	
	Institutional Connections (R)	Cash received	
		Arrears	
	Membership or Registration fees	Cash received	
		Arrears	
	Private connections	Cash received	
		Arrears	
	Total Arrears	Cash received	
	Total Cash received	Arrears	

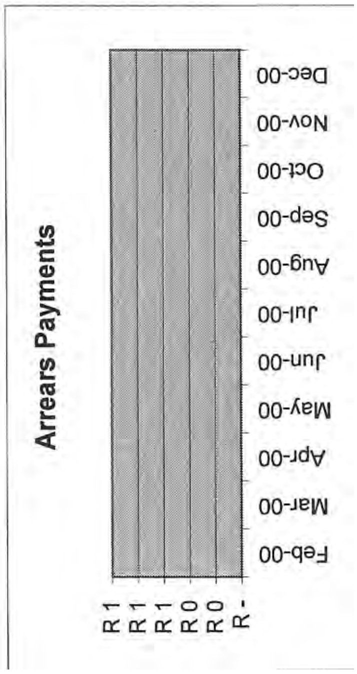
SUMMARY																
	Water Sales Revenue (R)	R	96,309	R 2,332	R 1,923	R 1,117	R 1,885	R 2,291	R 2,271	R 2,059	R 2,285	R 2,174	R 1,639	R 1,600	R 1,196
	Other Income (R)	R	0	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -	R -
	LWC O&M Costs (R)	R	225,219	R 1,897	R 11,445	R 17,648	R 16,698	R 3,415	R 2,456	R 2,126	R 2,112	R 2,543	R 2,144	R 1,950	R 25,035
	Overall Project O&M Costs (R)	R	582,718	R 9,633	R 39,360	R 32,974	R 42,523	R 23,646	R 2,456	R 2,126	R 2,112	R 2,543	R 2,144	R 1,950	R 48,296
	Unit Cost of Water (Overall costs)		#DIV/0!	R 4.25	R 4.17	R 4.62	R 4.51	R 3.71	R 3.74	R 4.13	R 3.72	R 3.91	R 5.19	R 5.31	R 1.84
	Unit Cost of Water (LWC costs)		#DIV/0!	R 4.25	R 4.17	R 4.62	R 4.51	R 3.71	R 3.74	R 4.13	R 3.72	R 3.91	R 5.19	R 5.31	R 1.84
	Monthly LWC Profit / (Loss) (R)	R	(128,909)	R 435	R (9,822)	R (16,531)	R (14,813)	R (1,124)	R (185)	R (67)	R 173	R (368)	R (505)	R (350)	R (15,839)
	Cumulative LWC Profit / (Loss) (R)		N/A	R 435	R (9,387)	R (25,918)	R (40,431)	R (41,555)	R (41,740)	R (41,807)	R (41,633)	R (42,002)	R (42,507)	R (42,857)	R (61,696)
	Cash Balance			R 435	R (12,932)	R (31,697)	R (50,280)	R (55,987)	R (60,714)	R (64,899)	R (69,295)	R (74,012)	R (77,795)	R (81,345)	R (115,784)
	Monthly Overall Project Profit / (Loss) (R)	R	(486,409)	R (7,301)	R (37,437)	R (31,557)	R (40,635)	R (21,355)	R (185)	R (67)	R 172	R (368)	R (505)	R (350)	R (42,100)
	Cumulative Overall Project Profit / (Loss) (R)		N/A	R (7,301)	R (44,738)	R (76,595)	R (117,233)	R (138,588)	R (138,773)	R (138,840)	R (138,667)	R (139,035)	R (139,540)	R (139,890)	R (181,990)


Cumulative Overall Project Profit / (Loss) (R)
R0
R(50,000)
R(100,000)
R(150,000)
R(200,000)
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00
Dec-00
Jan-01


Cumulative LWC Profit / (Loss) (R)
R10,000
R0
R(10,000)
R(20,000)
R(30,000)
R(40,000)
R(50,000)
R(60,000)
R(70,000)
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00
Dec-00
Jan-01


Unit Cost of Water (Overall costs)
R 7.00
R 6.00
R 5.00
R 4.00
R 3.00
R 2.00
R 1.00
R 0.00
Feb-00
May-00
Aug-00
Nov-00
Feb-01
May-01
Aug-01
Nov-01
Feb-02
May-02
Aug-02
Nov-02
Feb-03


Unit Cost of Water (LWC costs)
R 6.00
R 5.00
R 4.00
R 3.00
R 2.00
R 1.00
R 0.00
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00
Dec-00
Jan-01

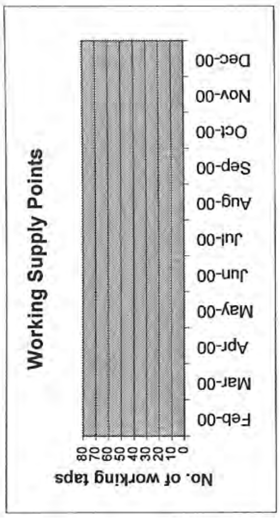

Arrears Payments
R 1
R 1
R 1
R 0
R 0
R -
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00
Dec-00

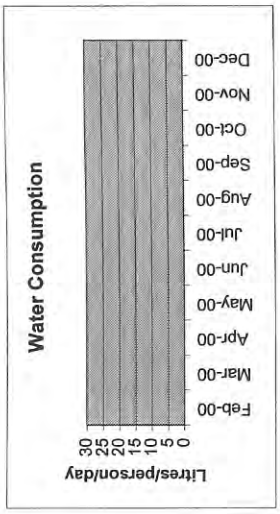
MONTHLY O & M REPORT - SERVICE INPUT DATA SHEET

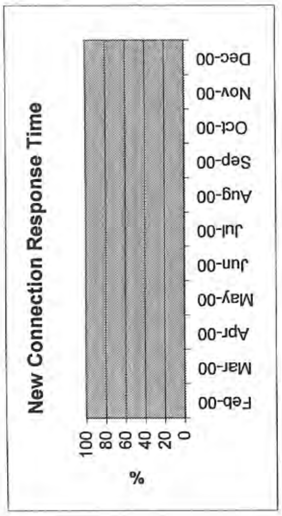
EMAYELISWENI/MTB

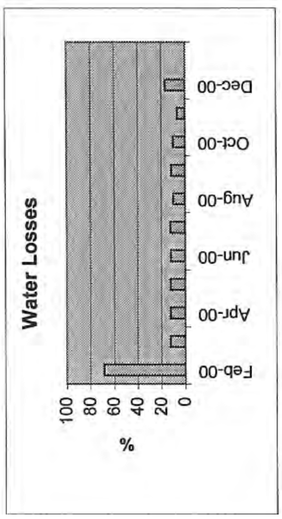
Reporting Month: Apr-03

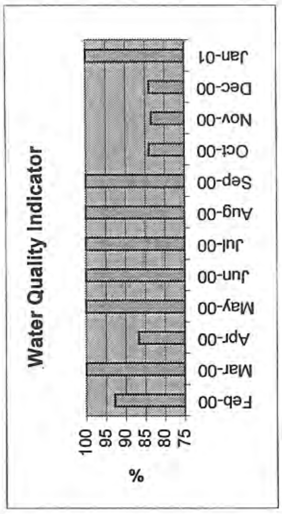
	Category / Code / Description		Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01
	Number of days in the month		28	31	30	31	30	31	31	30	31	30	31	31
Volumes	Metered volumes at Communal Standpipes (kl)	0.0												
	Metered volumes at Yard/House Connections (kl)	25995.1	500.0	510.0	460.0	471.0	573.0	568.0	514.7	572.0	543.6	409.8	400.0	1154.0
	Metered volumes at Institutional Connections (kl)	530.0												
	Bulk Supply, Buy-in or Production volume (kl)	91452.0	1600.0	1600.0	1600.0	1600.0	1648.0	1609.0	2015.0	1720.0	1992.0	3005.0	1200.0	1552.0
	Total metered volume at all dispensing points (kl)	26525.1	500.0	510.0	460.0	471.0	573.0	568.0	514.7	572.0	543.6	409.8	400.0	1154.0
	Equivalent volume sold (i.e consumption charge / retail tariff)	6943.1	583.0	480.8	279.3	471.3	572.8	567.8	514.7	571.25	543.6	409.8	400.0	1548.9
Service Level	Number of working taps in the system													
	Average number supplied by each tap													
	Total number of people being supplied		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Water consumption (litres/person/day)													
Losses	Unavoidable losses (kl / mth)	2200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	
	Adjusted Bulk Supply, Buy-in or Production Volume (kl / mth)	17389.0	1400.0	1400.0	1400.0	1400.0	1448.0	1409.0	1815.0	1520.0	1792.0	2805.0	1000.0	
	Water losses (UFW) in litres per connection per day	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	Water losses (UFW) in litres per kilometre of pipe per day	13646.5	1155.5	1034.2	1117.6	1071.2	1053.9	987.7	1423.4	1125.5	1374.2	2544.3	759.0	
	Water losses as a % of bulk water supply	185.7	68.8	12.5	12.5	12.5	12.1	12.4	9.9	11.6	10.0	6.7	16.7	
	Water losses as a % of adjusted bulk water supply	730.5	64.3	63.6	67.1	66.4	60.4	59.7	71.6	62.4	69.7	85.4	60.0	
Quality & Supply	No. of Days Quality Not Satisfactory	21	2	0	4	0	0	0	0		5	5	5	
	Water quality as a %		92.86	100.00	86.67	100.00	100.00	100.00	100.00	100.00	83.87	83.33	83.87	100.00
	No. of Service Interruptions	5720	300	0	1300	0	150	0	80	0	0	90	3800	
	Incidents of Vandalism	6	1	1	1	0	1		1	0	0	1		
	Number of tap days with water	0												
	Potential number of tap days with water	365	28	31	30	31	30	31	31	30	31	30	31	31
	Reliability of supply (%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Stock control	Total number of necessary stock items													
	Number of necessary items in stock													
	Level of Effectiveness (%)		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
New Connections response time	Total number of applications for connection													
	Number of new applications (for current month)													
	Number of new connections (for current month)													
	New connection response indicator (%)													
Accountability	Number of reports required to be sumitted to WSA (per annum)													
	Number of reports submitted													
	Accountability indicator (%)		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	No. of community meetings required to be held by WSP (per annum)													
	Number of community meetings held													
	Accountability indicator (%)													

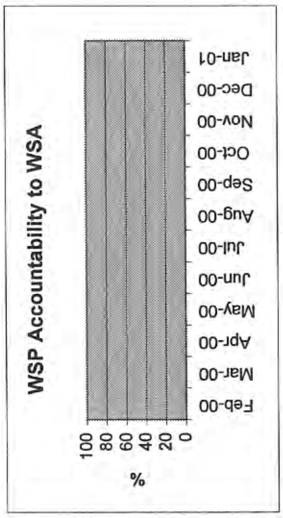

Working Supply Points
No. of working taps
80 70 60 50 40 30 20 10 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00

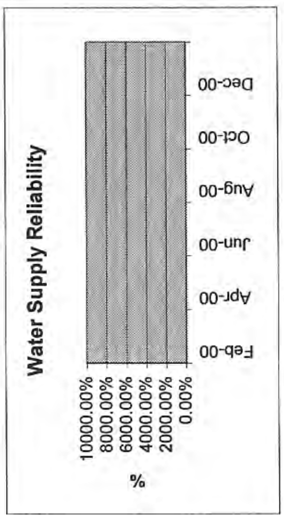

Water Consumption
Litres/person/day
30 25 20 15 10 5 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00

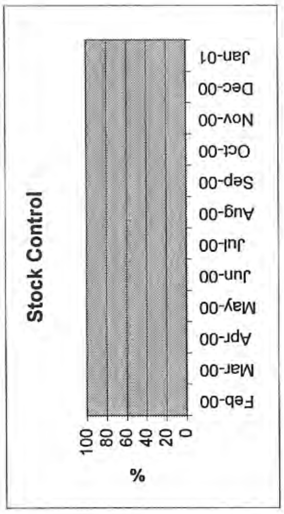

New Connection Response Time
%
100 80 60 40 20 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00

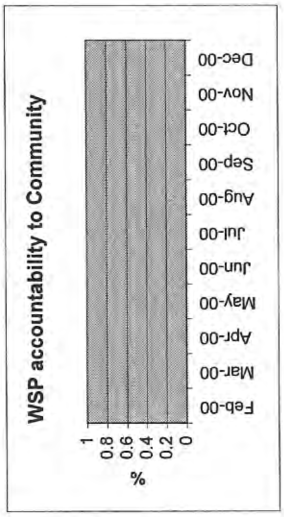

Water Losses
%
100 80 60 40 20 0
Feb-00 Apr-00 Jun-00 Aug-00 Oct-00 Dec-00


Water Quality Indicator
%
100 95 90 85 80 75
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00 Jan-01


WSP Accountability to WSA
%
100 80 60 40 20 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00 Jan-01


Water Supply Reliability
%
10000.00% 8000.00% 6000.00% 4000.00% 2000.00% 0.00%
Feb-00 Apr-00 Jun-00 Aug-00 Oct-00 Dec-00


Stock Control
%
100 80 60 40 20 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00 Jan-01


WSP accountability to Community
%
1 0.8 0.6 0.4 0.2 0
Feb-00 Mar-00 Apr-00 May-00 Jun-00 Jul-00 Aug-00 Sep-00 Oct-00 Nov-00 Dec-00

MONTHLY O&M REPORT - M&E KPI's

EMAYELISWENI/MTB 02KN024 KN022 **Reporting Month: Apr-03**

KPI - Description	Unit	Value	Comment
Delivery - Predetermined			
Final Capacity	Ml/day	0.23	Taken as limiting scheme capacity from main page. Could be taken from BP
Projected Consumption	litres/capita/day	25.00	Taken from BP
Assurance of Supply - Predetermined			
Projected Supply from source	Ml/day	0.80	Taken as Sustainable yield from main page.
Delivery - Actual			
Actual Delivery	Ml/day	0.0231	Total volume of sales converted to Ml/day
Actual Consumption	litres/Capita/day	#REF!	Taken from main page
Volume Delivered	Ml/month	0.7032	Total volume of sales converted to Ml/month
Interuptions per Month	No		Taken from data sheet
Duration of Breaks	days		Taken from data sheet
Yield from source	Ml/day	0.0794	Taken as production buy in converted to Ml/day
Water Quality	% of time satisfactory		an acceptable % needed
Sustainability			
O & M Cost per Family	as a % of ave income		Income survey needed (assumed R500 per month
Acceptability of Service Level	Score (1-5)		subjective
Cost Recovery			
System identified	Yes/No	yes	
Total Income to date	Rands	4,920.00	Taken from LWC report
Total operating Cost to date	Rands	13,002.00	Taken from LWC report
Adequacy of reserves	Months	0.00	If reserve postive divide monthly shortfall into reserve amount
Cost Effectiveness			
Estimated Supply Cost - Predetermined	R/Kl	19.75	Taken from LWC report
Actual Supply Cost	R/kl	31.03	Taken from LWC report
Maintenance and Admin Cost	R/kl	25.71	Taken from LWC report
Water Loss Management			
Water Loss %	%	51.74%	Taken from LWC report
Customer Satisfaction	Score (1-5)		Subjective
Environmental Impact	Score (1-5)		Subjective

DWAF O&M Report Format Revised: 10 August 2000

APPENDIX C

Data for analysis of benchmarks from rural water supply in South Africa

BENCHMARKING OF RURAL WATER SUPPLY IN SOUTH AFRICA

Province	Name of project	Was this a stand alone project? (Yes or No)	Was this an extension to an existing bulk supply? (Yes or No)	Total Length of Pipe in Project	No. families in project area	Number of public standpipes	Number of private connections	Total number of taps	Construction start year and end year (e.g. 1998 - 2000)	Capital Cost of Project (excluding operations support budget)	Cost escalated to 2004 (@8% per annum)	Limiting Capacity of Scheme (lowest of pump capacity/treatment capacity/source yield etc)	Describe the Free Water Policy and Tariff system in place (if known)
				m						R1000's	R1000's	m3/day	
KZN	Nkwambase	N	N	90000	900		750	750	1998	500	756	1560	Umgeni/Ilembe water tariff
KZN	Masibambisane	Y	N	140000	1800	60	1000	1060	1993-1003	10000	1080	800	
KZN	Nomponjwana	Y	N	172326	1125		890	890	1997	900	1439	1728	uThungulu rate
KZN	Fairview	Y	N	15000	250		230	230	1995	950	1683	480	Ugu rate
KZN	Emayliswen/Montebello	Y	N	34000	350		200	200	? - 1998	2067	3059	233	
KZN	Thokoza/Mitkini			43900	1207		606	606	? - 2003	11084	11971		
KN043	Mpundumane	Yes	No	10600	129	28			1997 - 1998	630	932		
KN051	Ogaya	Yes	No	2398	214	90			1997 - 1998	2734	4047		
KN339	Mbizo	No	Yes		1646	120			2002 - 2002	5621	6521		
KZN	Qadi	Y	N	77000	640	126		126	2002-2003	11000	11880	300	
KZN	Hambrook			10700	371	26		26	? - 2003	5156	5568	156	
KZN	Keat's Drift			75940	1711	102		102	? - 2003	26249	28349	302.86	
KN098	Middeldrift	No	Yes	54000	2193	55			1997 - 1999	14366	20112		
KN236	Mthimude	No	Yes		571	5			2003 - 2003	2000	2160		
KZN	Mbangawi				500					522			
KZN	Wittekip			5100	899					2058			
KZN	Mbono			9500	429					1365			
KN053	Ezengeni	Yes	No		386				1997 - 1998	1404	2078		
KN072	Nomponjwane	Yes	No		2571				1997 - 1999	10466	14652		
KZN	Matimatolo			83700	2171					14997			
KZN	Bambisanani			49200	351					2627			
KZN	Majorisu			28800	767					6307			
KZN	Mablessini			27800	233					2002			
KZN	Mangosotho Village			12100	857					7758			
KN069	Nqutu 2	No	Yes		1071				1999 - 2000	10306	13804		
KN141	Emnambithi	No	Yes	2500	957				1999 - 2001	10983	13818		
KZN	Hlanlindlela			17900	1143					13344			
KZN	Nkonjeni			2600	91					1069			
KZN	Tugela Ferry			49300	1265					15560			
KZN	Emanjokwene			5800	214					2811			
KZN	Kombuzi			34400	788					10889			
KZN	Ndatshana			98000	1214					16684			
KZN	Ngangane 1&2			93400	3571					51975			
KZN	Sampofu 1			44750	514					8032			
KZN	Annandale			3400	122					1945			
KN203	Braemar	Yes	No	44000	333				2001 - 2002	5358	6215		
KZN	Nqutu 1&2	N	Y	52250	2501					41467			
KZN	Nqutu 3			26420	287					4818			
KZN	Ndindini			81220	1709					31550			

Province	Name of project	Was this a stand alone project? (Yes or No)	Was this an extension to an existing bulk supply? (Yes or No)	Total Length of Pipe in Project	No. families in project area	Number of public standpipes	Number of private connections	Total number of taps	Construction start year and end year (e.g. 1998 - 2000)	Capital Cost of Project (excluding operations support budget)	Cost escalated to 2004 (@8% per annum)	Limiting Capacity of Scheme (lowest of pump capacity/treatment capacity/source yield etc)	Describe the Free Water Policy and Tariff system in place (if known)
KZN	Simlangetsha 2			30100	367					7366			
KZN	Springvale			63800	924					5755			
KZN	Emnambithi	N	Y	31040	953					6672			
KZN	Zwelitsha			61100	2478					20257			
KZN	Langkloof			5800	300					4001			
KZN	Kransdraai			4300	139					2300			
KZN	Moyeni			75700	1462					24288			
KZN	Nzinga			25540	739	68	10	78	? - 2001	9601	12028		
KZN	Ophindoweni			38000	1389	105		105	? - 2002	16766	19556		
KZN	Impilo/Esdlumubini			100000	1429	77	820	897	1995 - 2003	14800	15984	700	
KZN	Ndaleni			34000	5143	160		160	? - 2002	33588	39177		
KZN	Enkanyeszini			30000	737	40	63	103	? - 2000	8137	10897	250	
KZN	Mbazwana			35000	1950	70	211	281	? - 2001	27528	34486.6	1000	
KZN	Sonkombo	Y then N	Y	18000	540	30	2	32	2000	2600	3482	408	free from Umgeni for bulk
Limpopo Province	Bothetheletsa Water Supply	NO	NO	6235	130	20	0		2001-2001	1672	2074	Borehole capacity	
Limpopo Province	Ditsipeng Water Supply	NO	NO	31704	412	75	0		2001-2002	4027	4672	Borehole capacity	
Limpopo Province	Glen Red Water Supply	NO	NO	11006	550	36	0		2001-2002	2325	2697	Borehole capacity	
Limpopo Province	Mmatoro Water Supply	NO	NO	1236	48	7	0		2001-2002	574	666	Borehole capacity	
Limpopo Province	Matile Water Supply	NO	NO	9947	425	31	0		2001-2002	1479	1716	Borehole capacity	
Limpopo Province	Madibe Ga-Ratau Water Supply	NO	NO	3355	54	7	0		2001-2002	452	524	Borehole capacity	
Limpopo Province	Maubana Water Supply	NO	NO	13506	350	18	0		2001-2002	1468	1703	Borehole capacity	
Limpopo Province	Ga-Rapipa Water Supply	NO	NO	6482	140	21	0		2001-2002	1104	1280	Borehole capacity	
Eastern Cape	George Moshesh	yes	No	150000	3431	267	400	667	95-96 98-99	7800	12468	source (weir)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Masakala	yes	No	18000	612	87		87	98	1300	2078	pumps (b/holes)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Lukholweni	yes	No	7000	683	36		36	pre 95	600	1063	source (springs)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Phalani	yes	No	7000	357	7	49	56	pre 95	300	531	source (springs)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Madlangala Makomoreng	yes	No	24000	312	42	12	54	97 - 98	1000	1584	source (weir)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Mzongwana	yes	No	25500	1866	102		102	2002 - 2003	3900	4212	pumps (b/holes)	Effectively free water. Consumption is less than 6kl/hh/month
Eastern Cape	Likhetlane WSS, Mount Fletcher, Alfred Nzo DM	Yes	No	27700	702	62	0	62	2002 -2003	7315	7900	Pump capacity and Borehole Yield	Each Household is deemed to be approx. 6 persons. Each person is entitled to 25 ltr per day as the FBW allocation. Current Trends indicate usage of 8 - 10 Ltrs pp per day
Eastern Cape	Thaba Chicha WSS,Mount Fletcher, Alfred Nzo	Yes	No	100300	2741	281	0	281	2001-2002	21492	25068	Source Yield, Gravity Scheme	
Eastern Cape	Sipaqeni EU, Qaukeni, O R Tambo District	Yes	No	64600	3218	210	0	210	2000 - 2002	14838	17307	Pump capacity and Borehole Yield	
Eastern Cape	Mfundweni WSS, Umzimkulu, Alfred Nzo	Yes	Yes	14900	830	33	0	33	2001 - 2002	6005	7004	Water Treatment Plant capacity and Transfer	
Eastern Cape	Matatiele WSS, Alfred Nzo District	Yes	Yes	130100	3002	203	0	203	2000- 2001	19378	24411	Source Yield, Gravity Scheme	
Eastern Cape	Peddie South WSS, Ngqushwa, Amathole	Yes	No	108000	4366	267	0	267	1999 - 2002	24012	2811	Pump capacity and Borehole Yield	Each Household is deemend to be approx. 6 persons. Each person is entitled to 25 ltr per day as the FBW allocation. Current Trends indicate usage of 8 - 10 Ltrs pp per day
Eastern Cape	Toleni WSS, Mnquma, Amathole	No	Yes	65000	1737	117	0	117	2001 - 2003	19070	20596	Borehole. Sustainable yield of 2.1 l/s at maximum of 12	
Eastern Cape	Dwese WSS, Mbashe, Amathole	Yes	No	92000	1800	176	0	176	2001 - 2003	25242	27261	61 Kl per hour. Additional capacity built in phase 1 to	
Eastern Cape	Cwebe WSS Phase 1, Mbashe, Amathole	Yes	No	14000	300	41	0	41	2002 - 2003	12743	13762	26 Kl per hour. Additional capacity built in phase 1 to	

APPENDIX D

Summary of the report *The Development of a Successful Unaccounted-for Water Management Programme in the Rural Water Supply Context* by Janet Ross-Jordan

EXECUTIVE SUMMARY

Monitoring of rural water supply systems in KwaZulu Natal, South Africa, showed average unaccounted-for water (UAW) levels, sometimes loosely called water losses, of 60%, which were having financially detrimental effects on these, and other, projects. Despite a regulatory requirement for the Water Services Authorities (WSAs) to manage UAW, there was little guidance on rural UAW management. Therefore research was necessary to establish a strategy for developing rural UAW management programmes that could be used and understood by all stakeholders and would fit into existing community based management systems. This development began with an assessment of the system, by gathering information on social, technical, financial and institutional aspects, followed by field studies and calculations to discover the sources and acceptable levels of UAW, leading to a participatory workshop with stakeholders. Two case studies revealed firstly a lack of community understanding of the system, and secondly that the greatest UAW volumes were from physical losses, whereas non-physical losses made relatively small contributions to UAW volumes. The management programmes developed consisted of night flow readings on bulk meters and bulk/domestic water balances, with the project administrator assessing the meter readings and informing locally trained plumbers of the location and level of unacceptable UAW. If the plumbers could not take action to reduce the UAW the committee requested external support to tackle the problem. Key Performance Indicators (KPIs) were found to be a useful tool for setting system performance targets and for project monitoring. KPIs provided a link between the WSA and the committee, helping the WSA to support the community based management system. Further research could be aimed at developing UAW management programmes on other rural systems, and to developing community education techniques, promoting the need to report leaks promptly and reduce vandalism, using local schools.

What follows is an outline of the developed UAW management programme procedure, from a research project that comprised four months' work with two rural communities in KwaZulu Natal; Montebello and Emayelisweni. These communities had fully metered yard tap water supply systems managed through local water committees.
Table 1 shows the UAW levels within the four month period of the research. UAW levels will vary month by month and an accurate assessment is only valid with at least 12 months' data.

The high percentages observed are due to low consumption levels, and highlight the sensitivity of rural projects to relatively low volumes of UAW. Volume/tap/day can be understood at a community level and translating these figures into financial equivalents helps to motivate UAW management. The South African Code of Practice (SABS, 1999) prefers the term specific loss, Q_{sl}, in l/km/hr. This term will be useful to Water Service Authorities (WSAs) when comparing different systems but is unlikely to be understood at rural community levels.

Table 1 - UAW Levels

		% of total supply	l/tap/day (average)	l/km/hr (average)
Emayelisweni	**12 month average prior to research**	66%	272	41
	After initial field tests/repairs	28%	40	6
	2 months after implementation of UAW management programme	43%	88	13
	6 month average, 18 months after implementation of UAW programme	22 %	32	5
Montebello	**12 month average prior to research**	77%	411	111
	After initial field tests/repairs	53%	196	53
	2 months after implementation of UAW management programme	47%	130	35
	6 month average, 18 months after implementation of UAW programme	56 %	320	103

The management systems developed used litre/tap/day.

It can be seen that the community level staff have taken ownership of the UAW programme at Emayelisweni, with UAW stable at low levels. The viability of the neighbouring Montebello scheme, however, is much less affected by water losses, and this may partly explain why there has little improvement in UAW there. Montebello was also been adversely affected by several staff changes, and so retraining in UAW management was required (after which point there was again a marked improvement).

PROCEDURE

Figure 1 shows the procedure used in the management of UAW. It is a cyclic procedure with the main management being done at community level on a monthly basis and the local authority assisting in the annual overall management. Developing the management system used the same procedure and was in effect the first cycle.

Continual Assessment

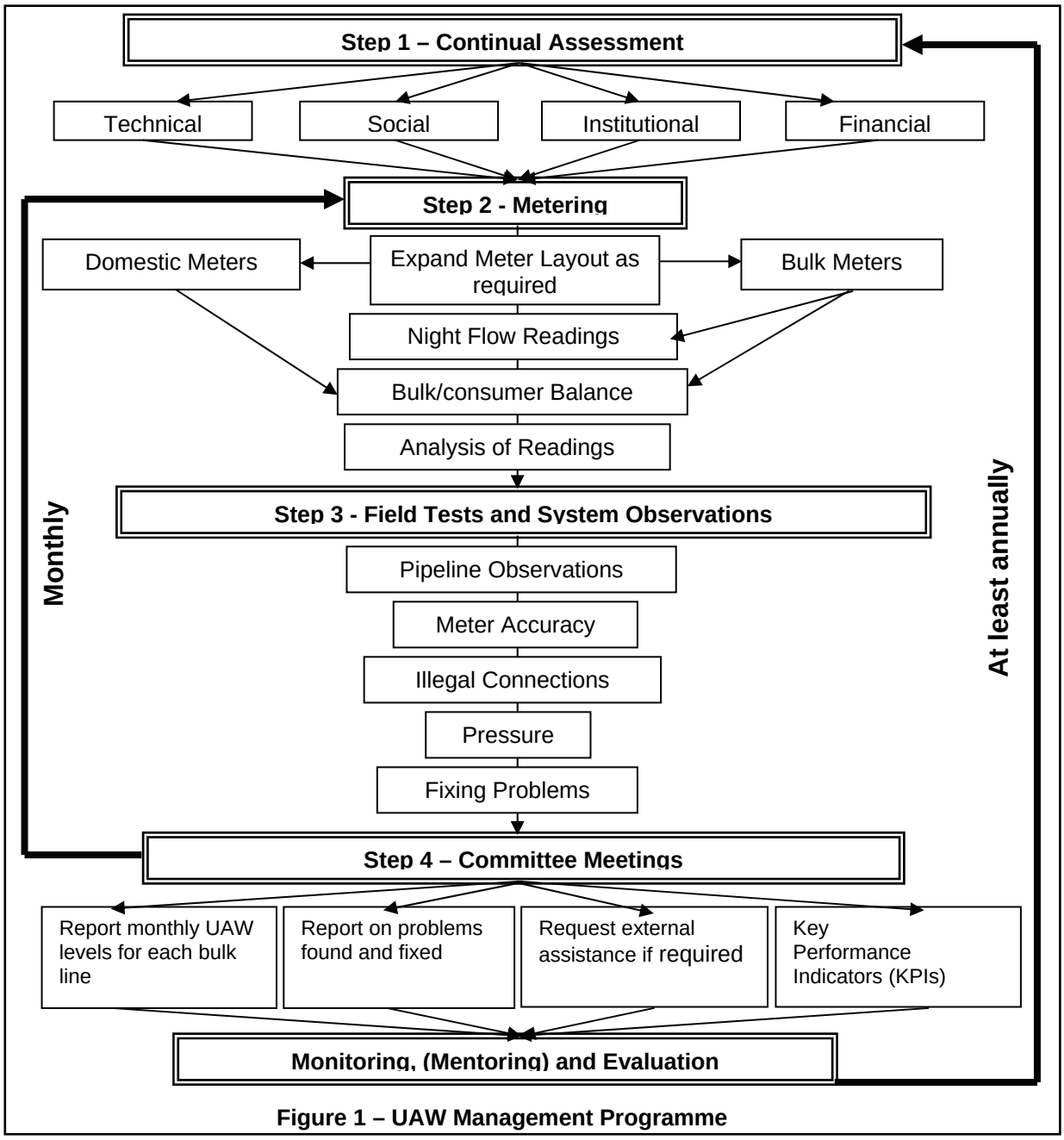


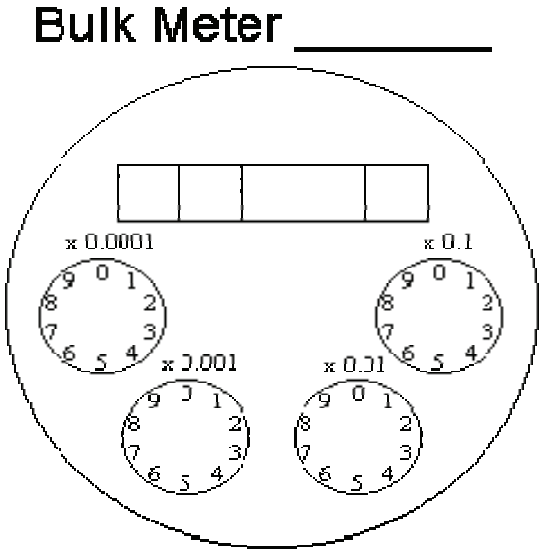
Figure 1 – UAW Management Programme

The project was assessed on institutional, social, financial and technical aspects, through field observations and by studying project records. Non-consideration of any one of these categories may render an inappropriate UAW management procedure.

Metering

Meter Layout: Where bulk meters are to be installed on a system, they should be accessible, affordable, and represent a manageable number of houses and a manageable length of pipeline. A system with adequate bulk metering makes UAW management feasible. Being able to read a bulk meter and all its associated domestic meters within, say, 3 hours improves the accuracy of any assessments of the readings. Locating bulk meters immediately after reservoirs or pipe junctions and at abstraction points breaks the infrastructure into manageable sections. Note that budgets in rural water supply usually preclude the use of the sophisticated continuous data logging which is becoming common in urban UAW management programmes.

Night-flow Readings: Generally people in poorer rural communities do not use water after nightfall. Taking bulk meter readings just before nightfall and at sunrise the following morning enables the night flow on each section to be calculated, giving an indication of leakage levels. At Emayelisweni these night flow readings are now taken once a week. The administrator or bookkeeper then calculates if the night flow is greater than 150 l/tap. If so technical staff investigate the section for UAW. 150 l/tap was considered an acceptable level of night flow, as this may include some consumption late in the evening or early in the morning.



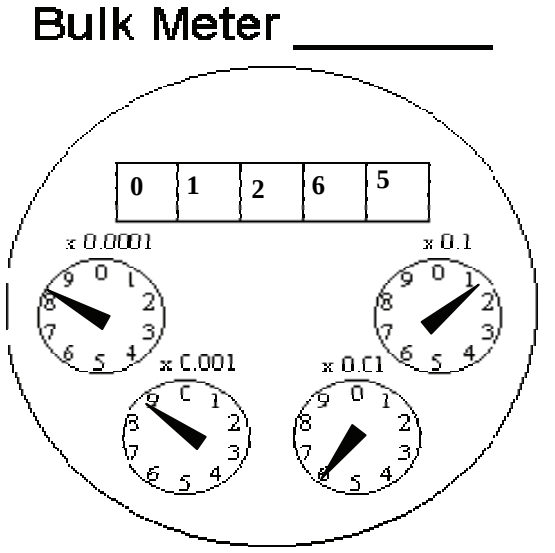


Figure 2 – Blank and Completed Bulk Meter Reading Sheets

Bulk Meter/Domestic Readings: On a fully metered system a water balance can be carried out by taking bulk meter readings with the domestic meter readings. If systems do not have domestic meter readings then an estimate must be made of the domestic water consumption, probably from a customer or household survey.

Bulk/consumer Balance: The UAW from a water balance could be due to leakage, illegal connections, faulty meters or faulty meter readings. Night flow readings can confirm or eliminate leakage.

Analysis: At Montebello and Emayelisweni a sheet was developed so meter readers could copy the bulk meter face. Figure 2 shows a blank meter reading sheet and an example of a completed sheet. This sheet helps the administrator to check the meter reading. At Emayelisweni and Montebello the determined acceptable level of UAW from the monthly water balance is 100l/tap/day. The water balance is calculated by the administrator/bookkeeper who then informs the committee and the technical staff of any necessary action to be taken.

Many software packages exist which compute acceptable UAW levels but none have been developed for rural situations. Access to these facilities rarely exists in rural communities.

Field Tests And System Observations

Once the water losses are narrowed down to specific branchlines these lines can be inspected. The methods outlined below should be used in turn until the UAW is reduced to an acceptable level, from the continued meter readings.

Pipeline Observations: Leakage was the most common and greatest cause of UAW. Visual inspection is the least costly method of investigation as little equipment is required and it is therefore wholly appropriate to the rural situation. Each valve chamber, tap, meter or other connection should be visually inspected for leaks, as well as the ground surface for depressions or damp patches. If leaks are not visible on the surface a 1.2 m length of reinforcing bar can be inserted into the ground, initially near each connection or joint, and checked to see if it is wet when withdrawn. If the bar is wet then the ground should be dug to investigate the source. This method requires the ground to be generally dry during the investigation and therefore has limitations.

Domestic Meter Accuracy Tests: Meters should be checked for accuracy, particularly where the billed consumption is zero or seems low. Meters often under-record at low flows, or fail to record at all, and filling a container of known volume from a tap and recording the volume change on the meter will indicate the accuracy of the meter. Meters will not record a dripping tap so if faulty taps are not reported and fixed, water flowing through the meter may not be recorded, or billed, and is therefore both UAW and a financial loss.

Illegal Connections: Illegal connections are not easy to find and, depending on the perpetrator, not safe to search for. Field searches for illegal connections should be a last resort when all other avenues have been explored. At Emayelisweni and Montebello illegal connections were, surprisingly, not a significant problem. The community perception suggested that illegal connections were high but in reality these claims were highly exaggerated.

Pressure: High pressure will cause any leaks that do develop to increase and lose more water. Lower pressures result in less leaks and smaller leaks. While pipes and fittings can often withstand pressures of 10-16 bar, these pressures invite UAW problems and it is advisable to limit supply pressures to 5 bar where possible. A simple pressure gauge can be temporarily installed onto taps. If the pressure is unacceptable then pressure reducing valves should be installed on the pipeline. Fixed ratio pressure valves are simple and robust. If finances cannot be made available to reduce pressures then potentially high UAW must be accepted.

Fixing Problems: There must be a procedure for fixing leaks, urgently and competently. Where possible, local labour should be used to fix any problems as this enhances understanding and ownership of the system, which increases the self-sustainability. A sense of urgency comes from an understanding of UAW. The level of technical competence depends on the quality of labour and training. A lack of local competence means external support must be available and contactable.

Committee Meetings

Committee meetings can be used to continually develop the UAW management programme by reporting on the UAW levels, the problems found and fixed, requesting necessary external assistance and reporting Key Performance Indicators (KPIs).

The committee meeting is where the WSA, local employees and the committee can interact.

Workshops: Workshops during the committee meetings helped to increase understanding of UAW, to develop the UAW management programme and allowed participation through discussion. These workshops were carried out with the committee members and local personnel including plumbers and the administrator.

The agenda used was as follows:

(i) *Why reduce losses?* An interactive discussion using pictures and asking which scenarios lose the project money. This led to a greater understanding of financial issues.

(ii) *Who lives where?* Participatory mapping aiding understanding of the pipe network. This map was then actually usable by the community.

(iii) *Where does all the water go?* A diagrammatic comparison of the daily household consumption and the equivalent daily UAW per household.

(iv) *What can we do?* Explaining night flow readings, domestic readings, inspections and repairs.

(v) *How we will manage losses.* Developing what they can do long term, including discussions of responsibilities and finances.

Monitoring, Mentoring And Evaluation

KPIs can be UAW specific. Other KPIs are also useful in monitoring the UAW management programme, e.g. monitoring the bank balance will highlight whether implementation of the UAW management programme is improving financial stability of the project.

Evaluation of the UAW management programme can be carried out by the water committee and the WSA. KPIs can be understood by both parties and serve as a link between them to demonstrate the effectiveness of the UAW management programme. Monthly committee meetings, or further workshops, could be used to discuss and develop the programme further, even by setting targets for system performance.

The administrators at Montebello and Emayelisweni were trained to chart KPIs (Stephen and Still, 2000) using wax crayons and standard blank sheets with a title and gridlines, the y-axis being set according to the chart drawn. Figure 3 shows a typical KPI chart.

It is expected that intensive mentoring will be required for the first two months of implementation of the programme. After this, mentoring will form part of the general project mentoring requirements. If mentoring is required the WSA must ensure that such support is provided and financed.

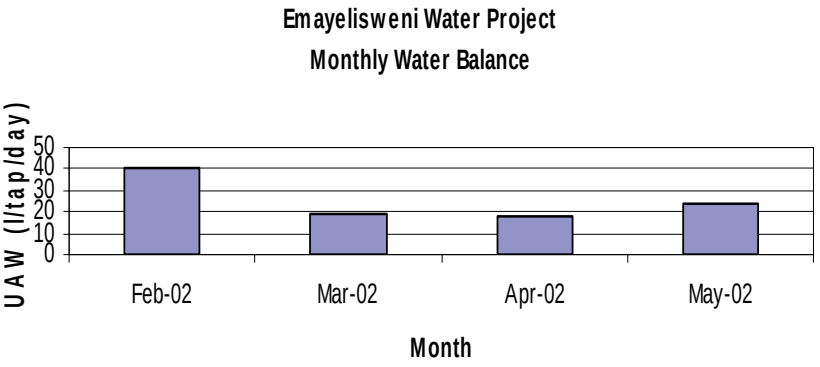


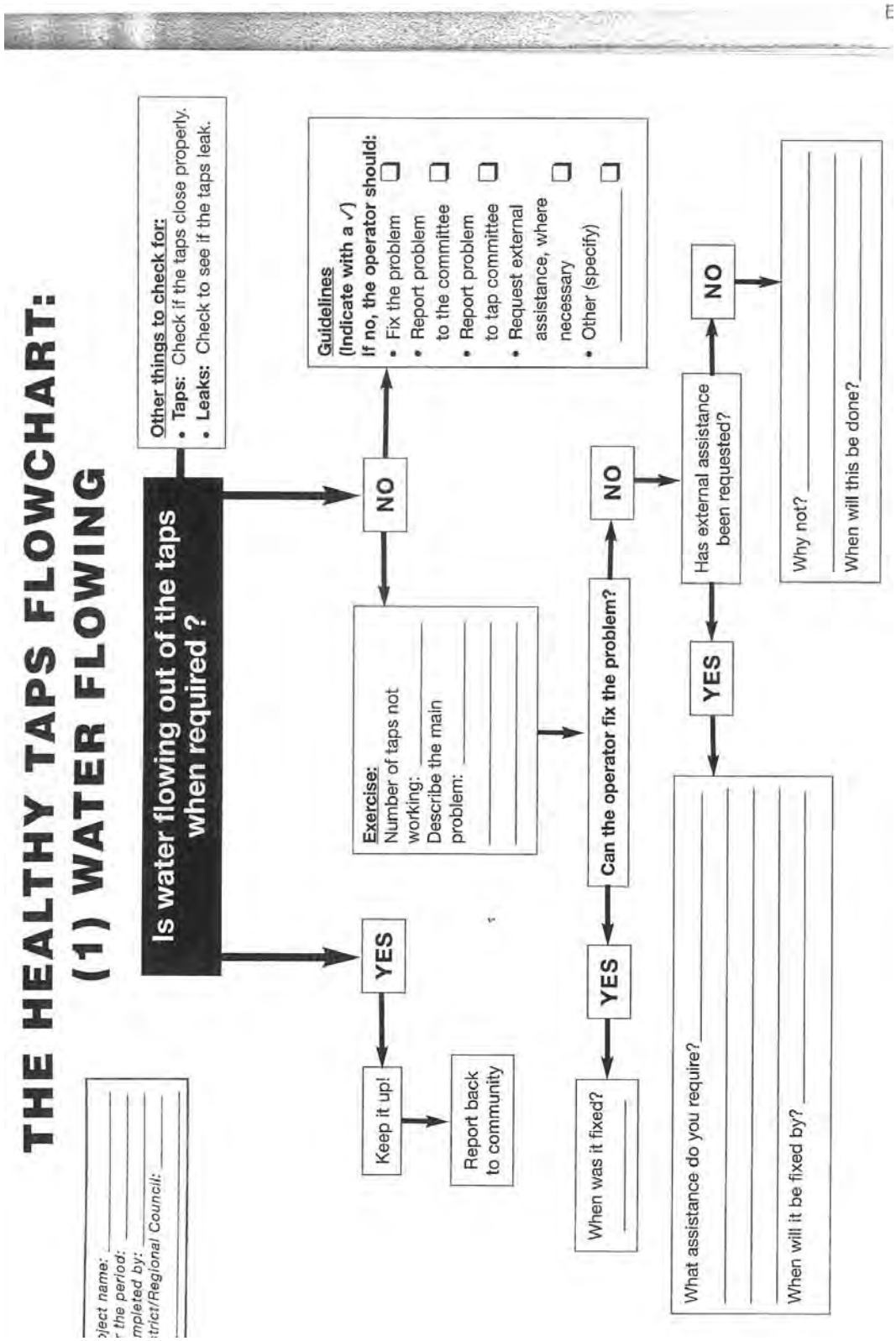
Figure 3 - KPI Chart Example

LEARNING POINTS

- Development of the UAW management procedure should be started at the outset of the project, not after implementation.
- Participatory approaches, such as mapping, can be used to help the communities understand the infrastructure as the project progresses.
- Using local personnel from the outset, i.e. during the first cycle of developing the system, may result in the initial problems taking longer to be fixed but will increase understanding and reduce the need for later training.
- Simple low cost techniques should be used to record meter readings and to analyse them.
- To ensure ongoing mentoring there must be some level of commitment, both in time and finance, from the WSA.
- Further research could develop UAW management programmes on other systems, use community education techniques, promote the need to report leaks promptly and reduce vandalism, possibly through using local schools.

APPENDIX E

Flowcharts developed by the Mvula Trust for DWAF to assist with field based monitoring



THE HEALTHY TAPS FLOWCHART: (2) WATER LOSS

Project name: _____
For the period: _____
Completed by: _____
District/Regional Council: _____
_____

Have there been indications of water loss in the past few weeks?

NO → Keep it up! → Report back to community

Things to check for:
- **Leaks:** Check to see if the ground above underground water pipes is dry.
- **Consumption:** 1. Compare this month's water consumption with last month's consumption. Are there any unexplained differences?
  2. Check the water meter at midnight. Unexplained consumption then may mean a leak.

YES → **Guidelines**
(Indicate with a ✓)
If yes, the operator should:
- Fix the problem ❑
- Report problem to the committee ❑
- Report problem to tap committee ❑
- Request external assistance, where necessary ❑
- Other (specify) _____ ❑

Exercise:
Where has the water loss occurred? _____
Describe the main problem: _____
_____

Can the operator fix the problem?

YES → When was it fixed? _____

NO → Has external assistance been requested?

YES → What assistance do you require? _____
_____
_____
When will it be fixed by? _____

NO → Why not? _____
When will this be done? _____

THE HEALTHY TAPS FLOWCHART: (3) PUMP / ENGINE

Project name: _____
For the period: _____
Completed by: _____
District/Regional Council: _____

Is the pump or engine in good working order?

Things to check for:
- **Heat:** Check if the pump or engine is running hot. Can your touch it with your bare hand?
- **Sound:** Check to hear if the pump or engine rattles when it runs. Is it mounted firmly on the floor?
- **Lubrication:** Check to see if there is enough oil in the pump or engine.

YES → Keep it up! → Report back to community

NO →

Guidelines
(Indicate with a ✓)
If yes, the operator should:
- Fix the problem ❑
- Report problem to the committee ❑
- Report problem to tap committee ❑
- Request external assistance, where necessary ❑
- Other (specify) _____ ❑

Exercise:
Describe the main problem: _____
_____

Can the operator fix the problem?

YES → When was it fixed? _____

NO → **Has external assistance been requested?**

YES → What assistance do you require? _____
_____
_____
When will it be fixed by? _____

NO → Why not? _____
When will this be done? _____

THE HEALTHY TAPS FLOWCHART: (4) RESERVOIR

Project name: _____
For the period: _____
Completed by: _____
District/Regional Council: _____

Is the reservoir in good working order?

YES → Keep it up! → Report back to community

Things to check for:
- **Leaks:** Check to see if there are any breaks or leaks in the walls.
- **Inflow:** Check to see if the inflow pipes are in good working order and whether there are any leaks.
- **Outflow:** Check to see if the outflow pipes are in good working order and whether there are any leaks.

NO → **Guidelines**
(Indicate with a ✓)
If yes, the operator should:
- Fix the problem ❑
- Report problem to the committee ❑
- Report problem to tap committee ❑
- Request external assistance, where necessary ❑
- Other (specify) _____ ❑

Exercise:
Describe the main problem: _____
_____

Can the operator fix the problem?

YES → When was it fixed? _____

NO → Has external assistance been requested?

YES → What assistance do you require? _____
_____
_____
When will it be fixed by? _____

NO → Why not? _____
When will this be done? _____

THE BOOKKEEPING FLOWCHART

Project name: _____
For the period: _____
Completed by: _____
District/Regional Council: _____
_____

Are the books kept up-to-date?

YES

Do they balance?

YES

Keep it up!

NO

Describe the problem:

_____
_____
_____
_____
_____

What action will be taken to solve the problem?

_____
_____
_____
_____
_____

NO

Books are behind by:

- 2 weeks ☐
- 4 weeks ☐
- 6 weeks ☐
- > 6 weeks ☐

When are they going to be updated by:

- 1 week ☐
- 2 weeks ☐
- 3 weeks ☐
- 1 month ☐

(A) Identify the problem

Why are the books not up-to date?

_____
_____
_____
_____

(B) Identify solutions

The committee will:

- Audit quarterly: _____
- List other actions:

_____
_____
_____
_____

The treasurer/bookkeeper will:

- Get the books up-to-date by:

_____

- List other actions:

_____

THE COST RECOVERY FLOWCHART

Project name: _____
For the period: _____
Completed by: _____
District/Regional Council: _____

Is the amount of money collected enough to cover the running costs of the project?

→ **NO**

YES → Keep it up!

(A) How many households have paid? _____
(B) How many households are supposed to pay? _____

The percentage payment = $\frac{(A)}{(B)}$ x 100

Percentage: _____ %

If no, the committee could take the following actions:
- cut off water
- fine defaulters
- give warning
- report to the community
- report to traditional leaders.

Exercise to determine profitability

Monthly income
Household contributions: _____
Bulk users: _____
Other: _____
Total: _____

General monthly expenses
Bulk water: _____
Salaries: _____
Rent: _____
Office costs: _____
Other: _____
Total: _____

O&M monthly expenses
Diesel / electricity: _____
Spare parts: _____
Replacement equipment: _____
Other: _____
Total: _____

Total monthly expenses
General expenses: _____
O&M: _____
Grand Total: _____

Profitability
Total monthly income: _____
Total monthly expenses: _____
Difference: _____

Do the profitability exercise

Then report back to the community
Has this been done for the previous month?

YES → When was it done? _____

NO → Why not? _____

When will it be done? _____

If no, how were the costs recovered?
- Through savings:
  Amount: _____
- Other (explain): _____

Amount: _____

Emergency Fund
- What is your target for the emergency fund? _____
- How big is your emergency fund at the moment? _____

WATER PROJECTS: EVALUATION CHART FOR PROJECTS AT CRITICAL MILESTONES FROM M&E SYSTE

REPORT PERIOD ENDING: September 30, 2003

							BUSINESS PLAN DEVELOPMENT STA						
PROJ. CODE	PROJECT NAME	IMPLEMENTING AGENT	DISTRICT MUNICIPALITY	REGIONAL COUNCIL	CONSULTANT	TYPE	IA appointed	Project consultant appointed	Social consultant appointed	PSC selected	Training plan approved	O&M plan approved	Transfer Plan completed
KN081	ESIGEDLENI	AQUAMANZI	DC29	6	AQUAMANZI / Kwezi V3 Cons. Eng	W					2011/11/11		
KN143	IMPILO	AQUAMANZI	DC29	5	PID/AquAmanzi	W							
KN211	KWAHLOPE	AQUAMANZI	DC29	6	V3 Consulting Engineers	W							
KN307	SUNDUMBILI WTP	DWAF	DC29	1	#N/A	Works							
KN308	SUNDUMBILI STP	DWAF	DC29	1	#N/A	Works							
KN226	ILEMBE LG SUPPORT	ILEMBE DM	DC29	6	#N/A	M				2011/11/11		2011/11/11	
KN231	BOTT EMERGENCY - ILEMBE DM	ILEMBE DM	DC29	6	AquAmanzi	E				2011/11/11		2011/11/11	
KN022	EMAYELISWENI	UMGENI WATER	DC29	6	Partners in Development	W							
KN023	ISIMINYA	UMGENI WATER	DC29	6	Goba Moahlali And Associates	W							
KN024	KWACHILI	UMGENI WATER	DC29	6	Thuthuka	W							
KN025	MATHOLAMNYAMA	UMGENI WATER	DC29	6	SKP Engineers	W							
KN026	NTABASKOP	UMGENI WATER	DC29	6	Goba Moahlali And Associates	W							
KN066	NKWAMBASE	UMGENI WATER	DC29	6	VKE Engineers	W							
KN068	SANS SOUCI	UMGENI WATER	DC29	6	ZAI	W							
KN106	MAQUMBE	UMGENI WATER	DC29	6	Willcocks, Reed & Kotze	W							
KN144	OZWATINI	UMGENI WATER	DC29	5	Partners in Development	W							
KN146	KWASHANGASE	UMGENI WATER	DC29	6	Thulani Consulting & Management Services	W							
KN147	MANGANGENI	UMGENI WATER	DC29	6	MMAL Consulting Engineers	W							
KN148	MASIBAMBISANE	UMGENI WATER	DC29	6	Partners in Development	W							
KN349	NTUNJAMBILI	UMGENI WATER	DC29	5	#N/A	W							
KN086	MATHONSI	UTHUNGULU DM	DC29	1	Bosch & Associates	W							
KN383	SUNDUMBILI / MATHONSI	UTHUNGULU DM	DC29	6	BKS (Pty) Ltd	W							

WATER PROJECTS: EVAM DATA (SUMMARY BY IMPLEMENTING AGENT)

REPORT PERIOD ENDING:

		NECESSARY MILESTONES (CRITICAL MILESTONES IN BOLD TEXT)																	
		GE				DESIGN STAGE					PRE-CONSTRUCTION STAGE								
PROJ. CODE	PROJECT NAME	Water Service Provider Identified	BP approved by PSC	**BP APPROVED (CONDITIONAL)**	BP APPROVED (UNCONDITIONAL)	Training Agent Appointed	PSC Training Started	Designs completed	PSC approval of designs	**DESIGN APPROVED BY IA/DWAF**	Tender document completed	Contractor appointed	project mgmt. Procedures established	Admin/financial training completed	Labour desk established	O&M fund set up	**START OF CONSTRUCTION**	O&M Admin. system in place	O&M programme in place
KN081	ESIGEDLENI					2011/11/11	2011/11/11							2011/11/11	2011/11/11				
KN143	IMPILO																		
KN211	KWAHLOPE																		
KN307	SUNDUMBILI WTP																		
KN308	SUNDUMBILI STP																		
KN226	ILEMBE LG SUPPORT		2011/11/11					2011/11/11	2011/11/11	2011/11/11	2011/11/11	2011/11/11							
KN231	BOTT EMERGENCY - ILEMBE DM		2011/11/11					2011/11/11	2011/11/11	2011/11/11	2011/11/11								
KN022	EMAYELISWENI																		
KN023	ISIMINYA																		
KN024	KWACHILI																		
KN025	MATHOLAMNYAMA																		
KN026	NTABASKOP																		
KN066	NKWAMBASE																		
KN068	SANS SOUCI																		
KN106	MAQUMBE																		
KN144	OZWATINI																		
KN146	KWASHANGASE																		
KN147	MANGANGENI																		
KN148	MASIBAMBISANE																		
KN349	NTUNJAMBILI																		
KN086	MATHONSI																		
KN383	SUNDUMBILI / MATHONSI										2011/11/11	2011/11/11	2011/11/11						

WATER PROJECTS: EVA

REPORT PERIOD ENDING:

EMPTY: Project has not reached this stage yet
GREY: Field is not applicable
RED: Milestone not achieved, KPI not reported
GREEN: Milestone achieved, reported
YELLOW : KPI reported and acceptable
PINK : KPI reported but not acceptable or data to be verified
BLUE: OTT Phase of Project

KPI MEASUREMENT SC	
1	No threat
2	Minor impact
3	Some Impact
4	Significant Impact
5	Major Impact

		CONSTRUCTION STAGE						MENTORSHIP PERIOD							IMPLEMENTATION					
PROJ. CODE	PROJECT NAME	Ongoing institution responsible approved	Selection of candidates (O&M)	O&M training completed	construction/labour training completed	ALL training completed	CONSTRUCTION 100% COMPLETE	Closure report submitted to DWAF	Asset survey completed	Completion certified	O&M Mentoring period complete	Retention paid	M&E system fully populated	TRANSFER (HAND OVER) PROJECT - WSA	Water Source Adequacy - Demand (lcd)	Water Source Adequacy - Supply (lcd)	Level Potential Environmental Impact	Level Water Quality Impact	Level Integration - other Community Activities	Quality of training
KN081	ESIGEDLENI														5	25	1	2	2	4
KN143	IMPILO														5	25	1	1	2	5
KN211	KWAHLOPE														25	25	1	1	4	
KN307	SUNDUMBILI WTP																			
KN308	SUNDUMBILI STP																			
KN226	ILEMBE LG SUPPORT																			
KN231	BOTT EMERGENCY - ILEMBE DM														3	5	1	2		
KN022	EMAYELISWENI														25	25	1	1	4	3
KN023	ISIMINYA														25	25	1	1	4	4
KN024	KWACHILI														25	25	1	1	4	
KN025	MATHOLAMNYAMA														25	25	1	1	4	3
KN026	NTABASKOP														25	25	1	1	4	4
KN066	NKWAMBASE														25	25	1	1	4	3
KN068	SANS SOUCI														25	25	1	1	4	
KN106	MAQUMBE														25	25	1	1	4	3
KN144	OZWATINI														25	25	1	1	4	
KN146	KWASHANGASE														25	25	1	1	4	
KN147	MANGANGENI														25	25	1	1	4	
KN148	MASIBAMBISANE														25	25	1	1	4	
KN349	NTUNJAMBILI														25	25	1	1	4	
KN086	MATHONSI														25	25	1	1	3	2
KN383	SUNDUMBILI / MATHONSI														25	15	1	1	3	1

WATER PROJECTS: EVA

CORING

REPORT PERIOD ENDING:

KPI MEASUREMENT SCORING	
1	No, Minimal, Little, Poor
2	Minor, Partial
3	Some, Willing
4	Significant, Fully committed, Good
5	Optimum, High, Fully acceptable, Exceptional, Major

KPI MEASUREI
Fixed measurement criteria ap
denoted by either a Yes or No

		INSTITUTIONAL DEVELOPMENT								KPI's RELATED TO THE LATEST CRITICAL MILESTONE REACHED										OPERATION /
PROJ. CODE	PROJECT NAME	APF involvement	TLC involvement	PSC involvement	Acceptability of PSC	Community awareness	Level of community initiative	Management capacity	Commitment to pay	Estimated Final capacity (Ml/day)	Projected Consumption (l/c/d)	Projected supply from Source (Ml/day)	Current Delivery (Ml/day)	Actual Consumption (l/c/day)	Volume Delivered (Ml/month)	Supply Interruptions (No. per month)	O&M Cost per family (% disposable income)	Quality meets Potable Standard	Cost Recovery System Identified	Unit cost of Water Supplied (R/kl)
KN081	ESIGEDLENI	5	5	2	2	3	2	1	2		25									
KN143	IMPILO	3	3	2	4	2	2	1	1		25									
KN211	KWAHLOPE	5	5	2	2	3	2	1	2											
KN307	SUNDUMBILI WTP																			
KN308	SUNDUMBILI STP																			
KN226	ILEMBE LG SUPPORT																			
KN231	BOTT EMERGENCY - ILEMBE DM	3	3								10							TRUE		
KN022	EMAYELISWENI	5	5	4	4	3	3	3	3		50	1		7	1	1	2	TRUE	TRUE	R 13.90
KN023	ISIMINYA	5	3	4	4	3	3	3	4		7									
KN024	KWACHILI																			
KN025	MATHOLAMNYAMA	5	3	3	4	3	3	4	3		10								TRUE	
KN026	NTABASKOP	5	3	4	3	3	3	3	4		7									
KN066	NKWAMBASE	5	5	3	4	3	3	3	3	2	25	2		23	12	2	3	TRUE	TRUE	R 7.56
KN068	SANS SOUCI																			
KN106	MAQUMBE	5	5	3	4	5	4	3	5	1	25	1		2	2			TRUE	TRUE	R 35.53
KN144	OZWATINI																			
KN146	KWASHANGASE																			
KN147	MANGANGENI																			
KN148	MASIBAMBISANE																			
KN349	NTUNJAMBILI																			
KN086	MATHONSI	1	1	3	3	2	2	2	3											
KN383	SUNDUMBILI / MATHONSI	4	4	2	3	2	2	2	2											

WATER PROJECTS: EVA

MENT SCORING
plied to these KPI's. Some
indication.

REPORT PERIOD ENDING:

		AND MAINTENANCE										OTHER M&E FIELDS THAT NEED TO BE POPULATED WI						
PROJ. CODE	PROJECT NAME	Total Operating Income (R)	Total Operating Cost (R)	Adequacy of Reserve Fund (No. of months)	Water Loss (%)	Duration of Breaks	Yield from Source	Estimated Cost of Water Supplied	Maint. And Admin Cost	Service Level acceptability (1 - 5)	Customer Satisfaction (1 - 5)	Village details, ie. People to be Served	No. of People Served to RDP standard	No. of People Served BELOW RDP standard	People Served Sanitation on a Water Project	Project coordinates	Project description	Actual Construction Costs
KN081	ESIGEDLENI											3990	5353					R 6,996,922
KN143	IMPILO											4000	4600					R 6,884,584
KN211	KWAHLOPE											5849						R 1
KN307	SUNDUMBILI WTP																	
KN308	SUNDUMBILI STP																	
KN226	ILEMBE LG SUPPORT																	
KN231	BOTT EMERGENCY - ILEMBE DM											10000		74900				R 186,828
KN022	EMAYELISWENI	R 2,200.00	R 2,200.00		66	1	1	R 4.00	11	4	3	1093	800					R 574,821
KN023	ISIMINYA											2900	2000					R 419,553
KN024	KWACHILI											5200						
KN025	MATHOLAMNYAMA							R 8.00				1000	1000					R 615,000
KN026	NTABASKOP							R 12.00				2000	1450					R 480,114
KN066	NKWAMBASE	[illegible]	R 16,440.00	1	73	1		R 2.00	5	2	3	9120	5347					R 4,983,781
KN068	SANS SOUCI											5347						
KN106	MAQUMBE	[illegible]	R 9,900.00	3	90			R 4.00	26	5	3	27000	15000					
KN144	OZWATINI											67000						
KN146	KWASHANGASE											14509						
KN147	MANGANGENI											4801						
KN148	MASIBAMBISANE											8000						
KN349	NTUNJAMBILI											5800						
KN086	MATHONSI											4000	500	1500				R 560,000
KN383	SUNDUMBILI / MATHONSI											16800	14800					R 1,076,747

LOGBOOK: DAILY MONITORING SHEET

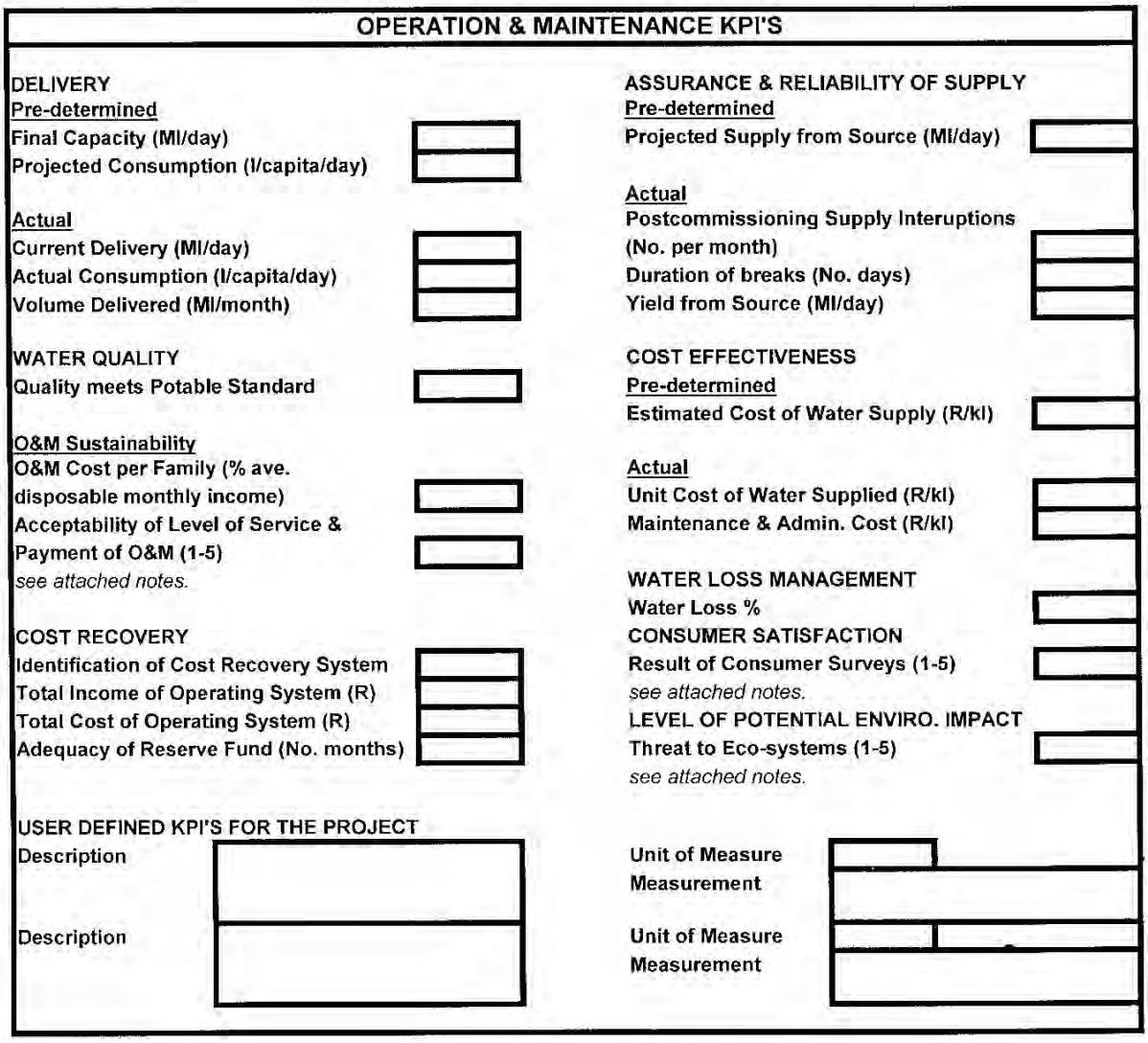
Project name: _____ *For the period:* _____

Completed by: _____ *District/Regional Council:* _____

Date	Problem reported and location	Action taken to fix or respond to the problem	Review of action taken to fix problem			
			Is the problem fixed? (Yes/no)	If yes, date fixed?	If no, what action will or has been taken to fix the problem?	Comments

APPENDIX F

Example of an Monitoring and Evaluations Report from the DWAF M&E System



OPERATION & MAINTENANCE MILESTONES			
	COMPLETION DATE (dd/mm/yy)		
DESCRIPTION	BASELINE	REVISED	ACTUAL
Operating authority WSP identified	27-11-97	27-11-97	27-11-97
Transfer plan completed	31-01-00	31-01-00	31-01-00
O&M & tariff/cost recovery plan approved by PSC	30-04-00	30-04-00	30-04-00
Identification of manpower & training requirements	30-05-00	30-05-00	30-05-00
Selection of suitable candidates	30-06-00	30-06-00	30-06-00
O&M training complete	30-11-00	30-11-00	
O&M administrative systems in place	30-08-00	30-08-00	
O&M programme in place for continuous maintenance	30-09-00	30-09-00	
O&M fund set up	30-06-98	30-06-98	30-06-98
Ongoing institutional responsibilities approved			
Commissioning of project	30-06-98	30-06-98	30-06-98
Transfer/handover of project	31-01-01	31-01-01	31-01-01
Asset survey completed	30-12-00	30-12-00	30-12-00
Completion certified	30-12-98	30-12-98	30-12-98
Retention paid	30-06-99	30-06-99	30-06-99
O&M mentoring period complete	31-01-01	31-01-01	31-01-01

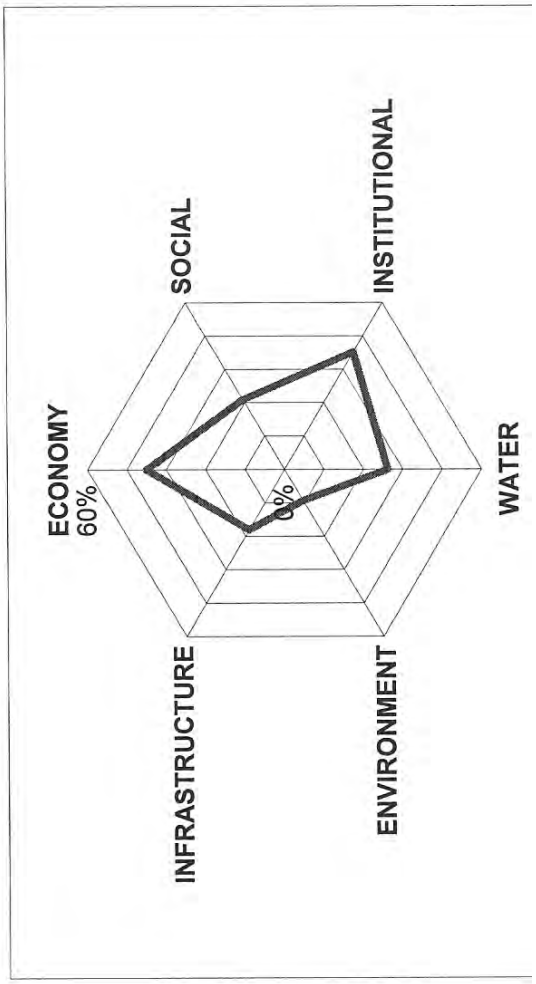
APPENDIX G

The first draft of the KPI system developed by DWAF-Norad (since superseded by the SusIT software developed by Leslie Strachan of the Council for Geosciences).

SD INDEX
30%
NOT sustainable

PROCESSING LEVEL 1 & INDEX

	CATEGORY	ACTUAL SCORE	MAX SCORE	SD index	SD STATUS
6	ECONOMY	236,760	564,000	42%	NOT sustainable
5	SOCIAL	319,000	1,269,000	25%	NOT sustainable
4	INSTITUTIONAL	174,000	412,000	42%	NOT sustainable
3	WATER	496,000	1,576,000	31%	NOT sustainable
2	ENVIRONMENT	20,000	180,000	11%	NOT sustainable
1	INFRASTRUCTURE	129,000	595,000	22%	NOT sustainable
	Total	1,374,760	4,596,000	30%	



PROCESSING: LEVEL 2 TO LEVEL 1

CAT	Source of information	ACTUAL SCORE	MAX SCORE	SD index	SD STATUS
6 ECON	37 WSA	99,600	277,000	36%	NOT sustainable
6 ECON	36 WSP	117,160	202,000	58%	Sustainable
6 ECON	35 Community	20,000	85,000	24%	Sustainable
5 SOCIAL	34 WSA	29,000	174,000	17%	NOT sustainable
5 SOCIAL	33 WSP	187,500	525,000	36%	NOT sustainable
5 SOCIAL	32 Community	92,500	520,000	18%	NOT sustainable
5 SOCIAL	31 Observed	10,000	50,000	20%	Sustainable
4 INSTITUT	30 WSP	102,000	220,000	46%	NOT sustainable
4 INSTITUT	29 WSA	72,000	142,000	51%	Sustainable
4 INSTITUT	28 Community	0	50,000	0%	Sustainable
3 WATER	27 Observed	90,000	353,000	25%	NOT sustainable
3 WATER	26 Reports	40,000	270,000	15%	NOT sustainable
3 WATER	27 Observed	284,000	813,000	35%	NOT sustainable
3 WATER	24 WSP	82,000	140,000	59%	Sustainable
2 ENVIR	23 Observed	20,000	120,000	17%	NOT sustainable
2 ENVIR	22 WSP	0	60,000	0%	Sustainable
1 INFRA	21 Observed	62,000	520,000	12%	NOT sustainable
1 INFRA	20 WSP	36,000	40,000	90%	Sustainable
1 INFRA	19 WSA	31,000	35,000	89%	Sustainable

TOTALS	1,374,760	4,596,000	30%

PROCESSING: FROM LEVEL 3 TO LEVEL 2

CAT	SOURCE	INDEX	Sustainability	SDI	SCORE	MAX	STATUS
3 WATER	38 WSA	312 Compliance with Acts, strategies & regulations					
6 ECON	37 WSA	101 Book-keeping and banking I	NOT sustainable	32%	16100	51000	
6 ECON	37 WSA	316 Dependency On External Support Agencies	Sustainable	54%	27000	50000	
6 ECON	37 WSA	103 Billing and collection	Sustainable	27%	9,000	33,000	
6 ECON	37 WSA	208 Tariff and tariff collection I	Sustainable	83%	27,500	33,000	
6 ECON	37 WSA	212 Cross subsidisation II	NOT sustainable	20%	10,000	50,000	
6 ECON	37 WSA	248 Mode of payment for water I	Sustainable	25%	10,000	40,000	
6 ECON	37 WSA	251 Cost recovery as % of O&M running costs I	Sustainable	0%	0	20,000	NOT sustainable
6 ECON	36 WSP	104 Billing and collection	Sustainable	79%	38,000	48,000	
6 ECON	36 WSP	317 Dependency On External Support Agencies	Sustainable	54%	27,000	50,000	
6 ECON	36 WSP	209 Tariff and tariff collection II	Sustainable	91%	40,160	44,000	
6 ECON	36 WSP	249 Mode of payment for water II	Sustainable	25%	10,000	40,000	
6 ECON	36 WSP	252 Cost recovery as % of O&M running costs II	Sustainable	10%	2,000	20,000	Sustainable
6 ECON	35 Community	211 Cross subsidisation I	Sustainable	20%	10,000	50,000	
6 ECON	35 Community	250 Mode of payment for water III	Sustainable	29%	10,000	35,000	Sustainable
5 SOCIAL	34 WSA	105 O+M programme I	Sustainable	49%	19,000	39,000	
5 SOCIAL	34 WSA	107 System of dealing with defaulters	NOT sustainable	0%	0	95,000	
5 SOCIAL	34 WSA	110 Complaints and conflicts resolution mechanisms	Sustainable	0%	0	10,000	
5 SOCIAL	34 WSA	245 Water service connections I	Sustainable	33%	10,000	30,000	
5 SOCIAL	34 WSA	267 Human resources: Required skills assessment (during implementation)	Sustainable	54%	27,000	50,000	NOT sustainable
5 SOCIAL	33 WSP	113 Labour supervision I	Sustainable	0%	0	20,000	
5 SOCIAL	33 WSP	106 O+M programme II	Sustainable	70%	35,000	50,000	
5 SOCIAL	33 WSP	108 System of dealing with defaulters I	Sustainable	5%	5,000	100,000	
5 SOCIAL	33 WSP	111 Complaints and conflicts resolution mechanisms	Sustainable	0%	0	30,000	
5 SOCIAL	33 WSP	115 WSP: Institutional capacity / human resources	Sustainable	59%	32,500	55,000	
5 SOCIAL	33 WSP	116 WSP: Representativity	Sustainable	16%	8,000	50,000	
5 SOCIAL	33 WSP	246 Water service connections II	Sustainable	33%	10,000	30,000	
5 SOCIAL	33 WSP	259 Community support of scheme I	Sustainable	50%	30,000	60,000	
5 SOCIAL	33 WSP	261 Sense of ownership of scheme I	Sustainable	88%	35,000	40,000	
5 SOCIAL	33 WSP	263 Community involvement I	NOT sustainable	0%	0	60,000	
5 SOCIAL	33 WSP	266 Human resources: Required skills assessment (during implementation)	Sustainable	64%	32,000	50,000	NOT sustainable
5 SOCIAL	32 Community	109 System of dealing with defaulters II	Sustainable	0%	0	100,000	
5 SOCIAL	32 Community	112 Complaints and conflicts resolution mechanisms	Sustainable	0%	0	10,000	
5 SOCIAL	32 Community	114 Labour supervision II	Sustainable	5%	500	10,000	
5 SOCIAL	32 Community	210 Tariff and tariff collection III	Sustainable	50%	5,000	10,000	
5 SOCIAL	32 Community	255 Preferred uses of water	Sustainable	20%	10,000	50,000	
5 SOCIAL	32 Community	257 Willingness to pay priority pattern	Sustainable	0%	0	60,000	
5 SOCIAL	32 Community	258 Actual spending priority pattern	Sustainable	17%	10,000	60,000	
5 SOCIAL	32 Community	318 Health, hygiene and sanitation	Sustainable	0%	0	60,000	
5 SOCIAL	32 Community	260 Community support of scheme II	Sustainable	53%	32,000	60,000	
5 SOCIAL	32 Community	262 Sense of ownership of scheme II	Sustainable	88%	35,000	40,000	
5 SOCIAL	32 Community	264 Community involvement II	NOT sustainable	0%	0	60,000	NOT sustainable
5 SOCIAL	31 Observed	319 Health, hygiene and sanitation					
5 SOCIAL	31 Observed	256 Actual uses of water	Sustainable	20%	10,000	50,000	Sustainable
4 INSTITU	30 WSP	117 Communication between WSA, WSP and Community	NOT sustainable	63%	50,000	80,000	
4 INSTITU	30 WSP	119 Communication between WSP and Community	Sustainable	53%	32,000	60,000	
4 INSTITU	30 WSP	201 Services provided by WSA (to WSP) I	NOT sustainable	25%	20,000	80,000	NOT sustainable
4 INSTITU	29 WSA	118 Communications between DWAF, WSA and WSP	Sustainable	54%	47,000	87,000	
4 INSTITU	29 WSA	202 Services provided by WSA (to WSP) II	Sustainable	45%	25,000	55,000	Sustainable
4 INSTITU	28 Community	200 Communication between WSP and Community	Sustainable	0%	0	50,000	Sustainable
3 WATER	27 Observed	214 Actual level of present service	Sustainable	14%	10,000	70,000	
3 WATER	27 Observed	216 Observed level of service	NOT sustainable	43%	30,000	70,000	

3 WATER	27 Observed	228 Water handling practices	Sustainable	13%	5,000	40,000	
3 WATER	27 Observed	229 Contamination risk assessment of on-site (dry) sanitation and wastewater disposal	NOT sustainable	0%	0	23,000	
3 WATER	27 Observed	242 Water metering	NOT sustainable	0%	0	40,000	
3 WATER	27 Observed	243 El metering	NOT sustainable	OK	20,000	30,000	
3 WATER	27 Observed	247 Water service connections III	Sustainable	33%	10,000	30,000	
3 WATER	27 Observed	254 Water contamination	Sustainable	30%	15,000	50,000	NOT sustainable
3 WATER	26 Reports	215 Design level of service	Sustainable	43%	30,000	70,000	
3 WATER	26 Reports	217 Source reliability I	NOT sustainable	0%	0	50,000	
3 WATER	26 Reports	222 Assessment of methods used for the determination of sustainable yield	Sustainable	0%	0	40,000	
3 WATER	26 Reports	224 Professional input for yield assessments	Sustainable	0%	0%	70,000	
3 WATER	26 Reports	253 Design water source	NOT sustainable	25%	10,000	40,000	NOT sustainable
3 WATER	25 Community	216 Source reliability II	Sustainable	0%	0	50,000	
3 WATER	25 Community	220 Alternative water sources used during dry months (backup schemes) I	Sustainable	0%	0	40,000	
3 WATER	25 Community	225 Quality acceptance of water from scheme	Sustainable	100%	70,000	70,000	
3 WATER	25 Community	226 Cultural and social acceptance of source	Sustainable	98%	39,000	40,000	
#VALUE!	25 Community	313 Compliance with Acts, strategies & regulations					
3 WATER	25 Community	244 Water quality variations	Sustainable	92%	55,000	60,000	NOT sustainable
3 WATER	24 WSP	219 Source reliability III	Sustainable	100%	50,000	50,000	
3 WATER	24 WSP	314 Compliance with Acts, strategies & regulations	Sustainable	54%	27,000	50,000	
3 WATER	24 WSP	221 Alternative water sources used during dry months (backup schemes) II	Sustainable	13%	5,000	40,000	Sustainable
2 ENVIR	23 Observed	227 Health - symptoms - AIDS/HIV CHECK!	Sustainable	0%	0	60,000	
2 ENVIR	23 Observed	230 Effects of groundwater abstraction	Sustainable	50%	20,000	40,000	
2 ENVIR	23 Observed	231 Effects (potential) of soil erosion on water quality from aquifer	NOT sustainable	0%	0	20,000	NOT sustainable
2 ENVIR	22 WSP	232 Water quality variations to consumers	Sustainable	0%	0	60,000	Sustainable
1 INFRA	21 Observed	240 Meters (condition of-)	Sustainable	0%	0	40,000	
1 INFRA	21 Observed	239 Reticulation system, condition of	Sustainable	30%	9,000	30,000	
1 INFRA	21 Observed	238 Treatment process(es)	Sustainable	0%	0	40,000	
1 INFRA	21 Observed	237 Treatment plant(s), condition of	Sustainable	0%	0	30,000	
1 INFRA	21 Observed	236 Reservoirs, condition of	Sustainable	12%	7,000	60,000	
1 INFRA	21 Observed	235 Transmission line(s), condition of	Sustainable	40%	20,000	50,000	
1 INFRA	21 Observed	234 Pump(s)	NOT sustainable	38%	15,000	40,000	
1 INFRA	21 Observed	233 Source(s) installation (excluding pumps & the source itself)	Sustainable	55%	11,000	20,000	
1 INFRA	21 Observed	207 Roughing filter	Sustainable	0%	0	70,000	
1 INFRA	21 Observed	206 Slow sand filter	Sustainable	0%	0	70,000	
1 INFRA	21 Observed	205 Chlorination	Sustainable	0%	0	70,000	NOT sustainable
1 INFRA	20 WSP	204 O&M resources II	Sustainable	90%	36,000	40,000	Sustainable
1 INFRA	19 WSA	203 O&M resources I	Sustainable	89%	31,000	35,000	Sustainable

TOTALS		2622%	1,281,760	4,113,000

STATISTICS

NUMBER OF "SUSTAINABLE" INDICES	70
TOTAL NUMBER OF INDICES	85
PERCENT OF "SUSTAINABLE" INDICES	82%

TOTAL MAXIMUM SCORE AFTER WEIGHTING	4,078,000
AUDIT SCORE	1,250,760
PERCENTAGE OF AUDIT SCORE	31%

G5

DRAFT

		DATA INPUT				PROCESSED DATA				
101 Book-keeping and banking I										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
1010	Books are up to date	100	0	50	1	10,000	20%	5,000	OK	
1011	Income and expenditure columns balance and add up	100	0	50	1	10,000	20%	5,000	OK	
1012	There are no gaps in the records	50	1	30	1	5,000	10%	1,500	OK	
1013	Supporting documents are kept	90	1	40	1	9,000	18%	3,600	OK	
1014	Bank balance/savings match the records	50	0	0	1	5,000	10%	0	NO GO!	
1015	The responsible person know how much savings are present	100	1	10	1	10,000	20%	1,000	OK	
1016	There is an accountability process for issuing of cheques/payments	20	1	0	1	2,000	4%	0	OK	
		510				51,000	100%	16,100	32%	NOT sustainable
102 Book-keeping and banking II										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1020	Books are up to date	100	0	100	1	10,000	21%	10,000	OK	
1021	Income and expenditure columns balance and add up	50	1	100	1	5,000	10%	5,000	OK	
1022	There are no gaps in the records	30	1	100	1	3,000	6%	3,000	OK	
1023	Supporting documents are kept	50	1	100	1	5,000	10%	5,000	OK	
1024	Bank balance/savings match the records	100	1	100	0	10,000	21%	0	OK	
1025	The responsible person know how much savings are present	100	1	100	1	10,000	21%	10,000	OK	
1026	There is an accountability process for issuing of cheques/payments	50	1	100	1	5,000	10%	5,000	OK	
		480				48,000	100%	38,000	79%	Sustainable
103 Billing and collection										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1030	There are records of expected income	80	1	50	1	8,000	24%	4,000	OK	
1031	There are records of defaulters/payers	100	0	0	1	10,000	30%	0	NO GO!	
1032	There are no outstanding invoices for external services	50	1	100	1	5,000	15%	5,000	OK	
1033	External services and procurements is paid by the WSP	0	1	0	1	0	0%	0	OK	
1034	Percentage of returns according to billing for water services?	100	1	0	0	10,000	30%	0	OK	
		330	Score			33,000	100%	9,000	27%	NOT sustainable
104 Billing and collection										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1040	There are records of expected income	100	1	100	1	10,000	30%	10,000	OK	
1041	There are records of defaulters/payers	100	1	70	1	10,000	30%	7,000	OK	
1042	There are no outstanding invoices for external services	100	1	100	1	10,000	30%	10,000	OK	
1043	External services and procurements is paid by the WSP	0	0	0	1	0	0%	0	OK	
1044	Percentage of returns according to billing for water services?	100	1	5	1	10,000	30%	500	OK	
		400	SO index			40,000	121%	27,500	69%	Sustainable
105 O+M programme I										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1050	O&M programme is in place	100	1	100	1	10,000	26%	10,000	OK	
1051	The O&M programme is being followed	100	1	0	1	10,000	26%	0	OK	
1052	Problems, costs and actions taken is being recorded	100	1	0	1	10,000	26%	0	OK	
1053	There is a record of external services support that can be accessed	50	1	100	1	5,000	13%	5,000	OK	
1054	The WSP has access to logistic support	40	1	100	1	4,000	10%	4,000	OK	
		390				39,000	100%	19,000	49%	Sustainable
106 O+M programme II										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1060	O&M programme is in place	100	1	100	1	10,000	20%	10,000	OK	
1061	The O&M programme is being followed	100	1	50	1	10,000	20%	5,000	OK	
1062	Problems, costs and actions taken is being recorded	100	1	0	1	10,000	20%	0	OK	
1063	There is a record of external services support that can be accessed	100	1	100	1	10,000	20%	10,000	OK	
1064	The WSP has access to logistic support	100	1	100	1	10,000	20%	10,000	OK	
		500				50,000	100%	35,000	70%	Sustainable
107 System of dealing with defaulters										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1070	There is a system for dealing with defaulters	100	0	0	1	10,000	11%	0	NO GO!	
1071	There are rules to define application of penalties for defaulters	100	0	0	1	10,000	11%	0	NO GO!	
1072	Penalties for defaulters are uniformly/fairly applied	100	0	0	1	10,000	11%	0	NO GO!	
1073	The number of defaulters is diminishing	100	1	0	1	10,000	11%	0	OK	
1074	Fines are used in dealing with defaulters	100	1	0	1	10,000	11%	0	OK	
1075	Cut-off used in dealing with defaulters	100	1	0	1	10,000	11%	0	OK	
1076	Warning is used in dealing with defaulters	100	1	0	1	10,000	11%	0	OK	
1077	Defaulters are reported to tribal authority	50	1	0	1	5,000	5%	0	OK	
1078	Defaulters are reported to WSA level	100	1	0	1	10,000	11%	0	OK	
1079	Defaulters are dealt with on an Ad hoc basis	100	1	0	1	10,000	11%	0	OK	
		950				95,000	100%	0	0%	NOT sustainable
108 System of dealing with defaulters I										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1080	There is a system for dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1081	There are rules to define application of penalties for defaulters	100	1	0	1	10,000	10%	0	OK	
1082	Penalties for defaulters are uniformly/fairly applied	100	1	0	1	10,000	10%	0	OK	
1083	The number of defaulters is diminishing	100	1	0	1	10,000	10%	0	OK	
1084	Fines are used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1085	Cut-off used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1086	Warning is used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1087	Defaulters are reported to tribal authority	100	1	0	1	10,000	10%	0	OK	
1088	Defaulters are reported to WSA level	100	1	0	1	10,000	10%	0	OK	
1089	Defaulters are dealt with on an Ad hoc basis	100	1	50	1	10,000	10%	5,000	OK	
		1000				100,000	100%	5,000	5%	Sustainable
109 System of dealing with defaulters II										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1090	There is a system for dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1091	There are rules to define application of penalties for defaulters	100	1	0	1	10,000	10%	0	OK	
1092	Penalties for defaulters are uniformly/fairly applied	100	1	0	1	10,000	10%	0	OK	
1093	The number of defaulters is diminishing	100	1	0	1	10,000	10%	0	OK	
1094	Fines are used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1095	Cut-off used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1096	Warning is used in dealing with defaulters	100	1	0	1	10,000	10%	0	OK	
1097	Defaulters are reported to tribal authority	100	1	0	1	10,000	10%	0	OK	
1098	Defaulters are reported to WSP level	100	1	0	1	10,000	10%	0	OK	
1099	Defaulters are dealt with on an Ad hoc basis	100	1	0	1	10,000	10%	0	OK	
		1000				100,000	100%	0	0%	Sustainable
110 Complaints and conflicts resolution mechanisms										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
1100	There is a process for the community to air grievances to the WSP	34	0	0	0	3,400	34%	0	OK	
1101	There is a mutually agreed system for resolving conflicts with the WSP	33	1	0	0	3,300	33%	0	OK	
1102	There is a process for receiving and responding to customer complaints	33	1	0	0	3,300	33%	0	OK	
		100				10,000	100%	0	0%	Sustainable
111 Complaints and conflicts resolution mechanisms										
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	

1110	There is a process for the community to air grievances to the WSP	100	1	0	0	10,000	33%	0	OK
1111	There is a mutually agreed system for resolving conflicts with the WSP	100	1	0	0	10,000	33%	0	OK
1112	There is a process for receiving and responding to customer complaints	100	1	0	0	10,000	33%	0	OK
		300				30,000	100%	0	0% Sustainable

112 Complaints and conflicts resolution mechanisms

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status
1120	There is a process for the community to air grievances to the WSP	33	0	0	0	3,300	33%	0	OK
1121	There is a mutually agreed system for resolving conflicts with the WSP	33	1	0	0	3,300	33%	0	OK
1122	There is a process for receiving and responding to customer complaints	34	1	0	0	3,400	34%	0	OK
		100				10,000	100%	0	0% Sustainable

113 Labour supervision I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status
1130	There is a system for monitoring the activities of the pump attendant	100	1	0	1	10,000	50%	0	OK
1131	WSP carried out supervision during the construction phase	100	1	0	1	10,000	50%	0	OK
		200				20,000	100%	0	0% Sustainable

114 Labour supervision II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status
1140	There is a system for monitoring the activities of the pump attendant	50	1	0	1	5,000	50%	0	OK
1141	WSP carried out supervision during the construction phase	50	1	10	1	5,000	50%	500	OK
		100				10,000	100%	500	5% Sustainable

115 WSP: Institutional capacity / human resources

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
1150	The WSP is satisfied with the office space and facilities available	100	1	0	1	10,000	18%	0	OK
1151	There is sufficient access to transport for internal O&M?	100	1	0	1	10,000	18%	0	OK
1152	There is access to telephone/fax	100	1	100	1	10,000	18%	10,000	OK
1153	Electricity is available at the WSP office	100	1	100	1	10,000	18%	10,000	OK
1154	The WSP is adequately staffed in terms of skills	50	1	50	1	5,000	9%	2,500	OK
1155	There is sufficient access to transportation for external O&M activities	100	1	100	1	10,000	18%	10,000	OK
		550				55,000	100%	32,500	59% Sustainable

116 WSP: Representativity

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
1160	Percentage of the WSP that are women	100	1	40	1	10,000	20%	4,000	OK
1161	The chairperson is a woman	100	1	0	1	10,000	20%	0	OK
1162	The WSP treasurer is a woman	100	1	0	1	10,000	20%	0	OK
1163	Percentage of persons younger than 35 years in WSP	100	1	40	1	10,000	20%	4,000	OK
1164	Church, Women's groups, tribal, civicsand political parties are represented	100	1	0	1	10,000	20%	0	OK
		500				50,000	100%	8,000	16% Sustainable

117 Communication between WSA, WSP and Community

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
1170	WSA is regularly reporting relevant developments in statutory standards and policies to the WSP	100	1	100	1	10,000	13%	10,000	OK
1171	TheWSP is regularly reporting to the WSA on cost recovery, downtime and water quantity	100	1	100	1	10,000	13%	10,000	OK
1172	The WSP is regularly reporting to the WSA on water quality	100	1	100	1	10,000	13%	10,000	OK
1173	The WSP is regularly reporting to the WSA on the condition of source	100	1	100	1	10,000	13%	10,000	OK
1174	The WSP reports regularly to community on income and expenditure statements	100	1	100	1	10,000	13%	10,000	OK
1175	The WSP reports regularly to community on defaulters and actions vs. defaulters	100	0	0	1	10,000	13%	0	NO GO!
1176	The WSP submits reports to the community at regular intervals	100	1	0	1	10,000	13%	0	OK
1177	There is a process for the community to air grievances to the WSP	100	1	0	1	10,000	13%	0	OK
1178	There is a mutually agreed system for resolving conflicts with the WSP	0	1	0	0	0	0%	0	OK
1179	There is a process of responding to customer complaints	800				80,000	100%	50,000	63% NOT sustainable

118 Communications between DWAF, WSA and WSP

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
1180	WSA is regularly reporting relevant developments in statutory standards and policies to the WSP	70	1	100	1	7,000	8%	7,000	OK
1181	TheWSP is regularly reporting to the WSA on cost recovery, downtime and water quantity	100	1	100	1	10,000	11%	10,000	OK
1182	The WSP is regularly reporting to the WSA and community on water quality	100	1	100	1	10,000	11%	10,000	OK
1183	The WSP is regularly reporting to the WSA on the condition of source	100	1	100	1	10,000	11%	10,000	OK
1184	DWAF is regularly reporting on relevant developments, standards and policies to WSA	100	1	100	1	10,000	11%	10,000	OK
1185	WSA has procedures in place to report to DWAF water quality standards detrimental to health	100	1	0	1	10,000	11%	0	OK
1186	The WSP submits general reports to the community at regular intervals	100	1	0	1	10,000	11%	0	OK
1187	There is a process for the community to air grievances to the WSP	100	1	0	1	10,000	11%	0	OK
1188	There is a mutually agreed system for resolving conflicts with the WSP	100	1	0	1	10,000	11%	0	OK
1189	There is a process of responding to customer complaints	870				87,000	100%	47,000	54% Sustainable

119 Communication between WSP and Community

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
1192	The WSP is regularly reporting to the WSA and community on water quality	100	1	20	1	10,000	17%	2,000	OK
1194	The WSP reports regularly to community on income and expenditure statements	100	1	100	1	10,000	17%	10,000	OK
1195	The WSP reports regularly to community on defaulters and actions vs. defaulters	100	1	100	1	10,000	17%	10,000	OK
1196	The WSP submits general reports to the community at regular intervals	100	1	100	1	10,000	17%	10,000	OK
1197	There is a process for the community to air grievances to the WSP	100	1	0	1	10,000	17%	0	OK
1198	There is a mutually agreed system for resolving conflicts with the WSP	100	1	0	1	10,000	17%	0	OK
		600				60,000	100%	32,000	53% Sustainable

200 Communication between WSP and Community

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
2002	The WSP is regularly reporting to the WSA and community on water quality	100	1	0	1	10,000	20%	0	OK
2004	The WSP reports regularly to community on income and expenditure statements	100	1	0	1	10,000	20%	0	OK
2005	The WSP reports regularly to community on defaulters and actions vs. defaulters	100	1	0	1	10,000	20%	0	OK
2006	The WSP submits general reports to the community at regular intervals					0	0%	0	OK
2007	There is a process for the community to air grievances to the WSP	100	1	0	1	10,000	20%	0	OK
2008	There is a mutually agreed system for resolving conflicts with the WSP	100	1	0	1	10,000	20%	0	OK
		500				50,000	100%	0	0% Sustainable

201 Services provided by WSA (to WSP) I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
2010	The WSA provides the WSP with support on logistics, when required	100	1	100	1	10,000	13%	10,000	OK
2011	The WSA provides the WSP with support on source monitoring, when required	100	0	0	1	10,000	13%	0	NO GO!
2012	The WSA provides the WSP with support on planning, when required	100	1	0	1	10,000	13%	0	OK
2013	The WSA provides the WSP with support on financial advise, when required	100	1	0	1	10,000	13%	0	OK
2014	The WSA provides the WSP with support on enforcing by-laws, when required	100	1	0	1	10,000	13%	0	OK
2015	The WSA provides the WSP with annual audit of performance of WSP, when required	100	1	0	1	10,000	13%	0	OK
2016	The WSA provides the WSP with support in less than a month, when requested	100	1	0	1	10,000	13%	0	OK
2017	The WSP is satisfied with the response time from the WSA	100	1	100	1	10,000	13%	10,000	OK
		800				80,000	100%	20,000	25% NOT sustainable

202 Services provided by WSA (to WSP) II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status
2020	The WSA provides the WSP with support on logistics, when required	50	1	100	1	5,000	9%	5,000	OK
2021	The WSA provides the WSP with support on source monitoring, when required	50	1	0	1	5,000	9%	0	OK
2022	The WSA provides the WSP with support on planning, when required	50	1	100	1	5,000	9%	5,000	OK
2023	The WSA provides the WSP with support on financial advise, when required	50	1	100	1	5,000	9%	5,000	OK
2024	The WSA provides the WSP with support on enforcing by-laws, when required	50	1	0	1	5,000	9%	0	OK
2025	The WSA provides the WSP with annual audit of performance of WSP, when required	100	1	0	1	10,000	18%	0	OK
2026	The WSA provides the WSP with support in less than a month, when requested	100	1	100	1	10,000	18%	10,000	OK

2027	The WSP is satisfied with the response time from the WSA	100	1	0	0	10,000	18%	0	OK	
		550				55,000	100%	25,000	45%	Sustainable

203 O&M resources I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
2030	Inverse rating of distance to critical skills (1000-0km)	100	1	90	1	10,000	10%	9,000	OK	
2031	Inverse rating of distance to critical spares? (1000-0km)	100	1	90	1	10,000	10%	9,000	OK	
2032	The WSA knows what costs are involved in running system	50	1	100	1	5,000	5%	5,000	OK	
2033	Rating of plant operator skill & attendance	100	1	80	1	10,000	10%	8,000	OK	
		350				35,000	35%	31,000	89%	Sustainable

204 O&M resources II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
2040	Inverse rating of distance to critical skills (1000-0km)	100	1	90	1	10,000	10%	9,000	OK	
2041	Inverse rating of distance to critical spares? (1000-0km)	100	1	90	1	10,000	10%	9,000	OK	
2042	The WSA knows what costs are involved in running system	100	1	100	1	10,000	10%	10,000	OK	
2043	Rating of plant operator skill & attendance	100	1	80	1	10,000	10%	8,000	OK	
		400				40,000	40%	36,000	90%	Sustainable

205 Chlorination

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2050	System in place	100	1	0	0	10,000	14%	0	OK	
2051	System is in working condition	100	1	0	0	10,000	14%	0	OK	
2052	This facility treats what percentage of scheme's water?	100	1	0	0	10,000	14%	0	OK	
2053	Assess the likelihood of continued operation into the foreseeable future	100	1	0	0	10,000	14%	0	OK	
2054	Are there similar backup schemes in place?	100	1	0	0	10,000	14%	0	OK	
2055	Operational index (operational time / total supposed working time)	100	1	0	0	10,000	14%	0	OK	
2056	Are there backup source(s) in place?	100	1	0	0	10,000	14%	0	OK	
		700				70,000	100%	0	0%	Sustainable

206 Slow sand filter

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2060	System in place	100	1	0	0	10,000	14%	0	OK	
2061	System is in working condition	100	1	0	0	10,000	14%	0	OK	
2062	This facility treats what percentage of scheme's water?	100	1	0	0	10,000	14%	0	OK	
2063	Assess the likelihood of continued operation into the foreseeable future	100	1	0	0	10,000	14%	0	OK	
2064	Are there similar backup schemes in place?	100	1	0	0	10,000	14%	0	OK	
2065	Operational index (operational time / total supposed working time)	100	1	0	0	10,000	14%	0	OK	
2066	Are there backup source(s) in place?	100	1	0	0	10,000	14%	0	OK	
		700				70,000	100%	0	0%	Sustainable

207 Roughing filter

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2070	System in place	100	1	0	0	10,000	14%	0	OK	
2071	System is in working condition	100	1	0	0	10,000	14%	0	OK	
2072	This facility treats what percentage of scheme's water?	100	1	0	0	10,000	14%	0	OK	
2073	Assess the likelihood of continued operation into the foreseeable future	100	1	0	0	10,000	14%	0	OK	
2074	Are there similar backup schemes in place?	100	1	0	0	10,000	14%	0	OK	
2075	Operational index (operational time / total supposed working time)	100	1	0	0	10,000	14%	0	OK	
2076	Are there backup source(s) in place?	100	1	0	0	10,000	14%	0	OK	
		700				70,000	100%	0	0%	Sustainable

208 Tariff and tariff collection I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2080	Tariff in place	100	1	100	1	10,000	30%	10,000	OK	
2081	Collection of funds takes place	50	1	100	1	5,000	15%	5,000	OK	
2082	Tariff was decided upon by community	100	1	100	1	10,000	30%	10,000	OK	
2083	The process of tariff collection is transparent and accepted by community	10	1	100	1	1,000	3%	1,000	OK	
2084	Tariff collection is carried out by means of Door-to-door	10	1	50	1	1,000	3%	500	OK	
2085	Tariff collection is centralised (in community)	10	1	50	1	1,000	3%	500	OK	
2086	Open parameter	50	1	10	1	5,000	15%	500	OK	
		330				33,000	100%	27,500	83%	Sustainable

209 Tariff and tariff collection II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2090	Tariff in place	100	1	100	1	10,000	23%	10,000	OK	
2091	Collection of funds takes place	100	1	100	1	10,000	23%	10,000	OK	
2092	Tariff was decided upon by community	50	1	100	1	5,000	11%	5,000	OK	
2093	The process of tariff collection is transparent and accepted by community	40	1	100	1	4,000	9%	4,000	OK	
2094	Tariff collection is carried out by means of Door-to-door	100	1	100	1	10,000	23%	10,000	OK	
2095	Tariff collection is centralised (in community)	10	1	100	1	1,000	2%	1,000	OK	
2096	Open parameter	40	1	4	1	4,000	9%	160	OK	
		440				44,000	100%	40,160	91%	Sustainable

210 Tariff and tariff collection III

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2100	Tariff in place	10	1	100	1	1,000	10%	1,000	OK	
2101	Collection of funds takes place	10	1	100	1	1,000	10%	1,000	OK	
2102	Tariff was decided upon by community	10	1	100	1	1,000	10%	1,000	OK	
2103	The process of tariff collection is transparent and accepted by community	10	1	0	1	1,000	10%	0	OK	
2104	Tariff collection is carried out by means of Door-to-door	10	1	100	1	1,000	10%	1,000	OK	
2105	Tariff collection is centralised (in community)	10	1	100	1	1,000	10%	1,000	OK	
2106	Open parameter	40	1	0	0	4,000	40%	0	OK	
		100				10,000	100%	5,000	50%	Sustainable

211 Cross subsidisation I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2110	Differential tariff rates are in place	100	1	0	1	10,000	20%	0	OK	
2111	There is subsidisation of water by local industry or commerce	100	1	0	1	10,000	20%	0	OK	
2112	The WSA provides subsidies	100	1	100	1	10,000	20%	10,000	OK	
2113	There is community cross subsidisation (in kind)	100	1	0	1	10,000	20%	0	OK	
2114	There is potential for cross subsidisation	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	10,000	20%	Sustainable

212 Cross subsidisation II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2120	Differential tariff rates are in place	100	0	0	1	10,000	20%	0	NO GO!	
2121	There is subsidisation of water by local industry or commerce	100	0	0	1	10,000	20%	0	NO GO!	
2122	The WSA provides subsidies	100		100		10,000	20%	0	OK	
2123	There is community cross subsidisation (in kind)	100	1	100	1	10,000	20%	10,000	OK	
2124	There is potential for cross subsidisation	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	10,000	20%	NOT sustainable

214 Actual level of present service

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2140	Hand pumps, %	100	1	0	1	10,000	14%	0	OK	
2141	Communal stand pipe, %	100	1	100	1	10,000	14%	10,000	OK	
2142	Yard connection, %	100	1	0	1	10,000	14%	0	OK	
2143	Single tap, %	100	1	0	1	10,000	14%	0	OK	
2144	Multiple tap, %	100	1	0	1	10,000	14%	0	OK	
2145	Traditional sources, %	100	1	0	1	10,000	14%	0	OK	

2146	Percentage of community served within legal max distance to water points?	100	1	0	1	10,000	14%	0	OK	
		700				70,000	100%	10,000	14%	Sustainable

215 Design level of service

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2150	Hand pumps, %	100	1	0	1	10,000	14%	0	OK	
2151	Communal stand pipe, %	100	1	100	1	10,000	14%	10,000	OK	
2152	Yard connection, %	100	1	100	1	10,000	14%	10,000	OK	
2153	Single tap, %	100	1	100	1	10,000	14%	10,000	OK	
2154	Multiple tap, %	100	1	0	1	10,000	14%	0	OK	
2155	Traditional sources, %	100	1	0	1	10,000	14%	0	OK	
2156	Percentage of community served within legal max distance to water points?	100	1	0	1	10,000	14%	0	OK	
		700				70,000	100%	30,000	43%	Sustainable

216 Observed level of service

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2160	Hand pumps, %	100	1	0	1	10,000	14%	0	OK	
2161	Communal stand pipe, %	100	1	100	1	10,000	14%	10,000	OK	
2162	Yard connection, %	100	1	100	1	10,000	14%	10,000	OK	
2163	Single tap, %	100	1	100	1	10,000	14%	10,000	OK	
2164	Multiple tap, %	100	1	0	1	10,000	14%	0	OK	
2165	Traditional sources, %	100	1	0	1	10,000	14%	0	OK	
2166	Percentage of community served within legal max distance to water points?	100	1	0	1	10,000	14%	0	OK	
		700				70,000	100%	30,000	43%	NOT sustainable

217 Source reliability I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2170	How much of the year is the main source operational? (%)	100	1	0	0	10,000	20%	0	OK	
2171	There are no seasonal changes in the water quality from main source	100	1	0	0	10,000	20%	0	OK	
2172	There are no restrictions relating to water source utilisation	100	1	0	0	10,000	20%	0	OK	
2173	There are no disputes with other communities regarding availability of water	100	1	0	0	10,000	20%	0	OK	
2174	There are guidelines as to maximum use of water abstraction from the source(s)	100	1	0	0	10,000	20%	0	OK	
		500				50,000	100%	0	0%	NOT sustainable

218 Source reliability II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2180	How much of the year is the main source operational? (%)	100	1	0	0	10,000	20%	0	OK	
2181	There are no seasonal changes in the water quality from main source	100	1	0	0	10,000	20%	0	OK	
2182	There are no restrictions relating to water source utilisation	100	1	0	0	10,000	20%	0	OK	
2183	There are no disputes with other communities regarding availability of water	100	1	0	0	10,000	20%	0	OK	
2184	There are guidelines as to maximum use of water abstraction from the source(s)	100	1	0	0	10,000	20%	0	OK	
		500				50,000	100%	0	0%	Sustainable

219 Source reliability III

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2190	How much of the year is the main source operational? (%)	100	1	100	1	10,000	20%	10,000	OK	
2191	There are no seasonal changes in the water quality from main source	100	1	100	1	10,000	20%	10,000	OK	
2192	There are no restrictions relating to water source utilisation	100	1	100	1	10,000	20%	10,000	OK	
2193	There are no disputes with other communities regarding availability of water	100	1	100	1	10,000	20%	10,000	OK	
2194	There are guidelines as to maximum use of water abstraction from the source(s)	100	1	100	1	10,000	20%	10,000	OK	
		500				50,000	100%	50,000	100%	Sustainable

220 Alternative water sources used during dry months (backup schemes) I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2200	River (outside the scheme)%	100	1	0	0	10,000	25%	0	OK	
2201	Dam (outside the scheme) %	100	1	0	0	10,000	25%	0	OK	
2202	Boreholes not part of this scheme %	100	1	0	0	10,000	25%	0	OK	
2203	Other sources not part of this scheme %	100	1	0	0	10,000	25%	0	OK	
		400				40,000	100%	0	0%	Sustainable

221 Alternative water sources used during dry months (backup schemes) II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2210	River (outside the scheme)%	100	1	0	1	10,000	25%	0	OK	
2211	Dam (outside the scheme) %	100	1	0	1	10,000	25%	0	OK	
2212	Boreholes not part of this scheme %	100	1	0	1	10,000	25%	0	OK	
2213	Other sources not part of this scheme %	100	1	50	1	10,000	25%	5,000	OK	
		400				40,000	100%	5,000	13%	Sustainable

222 Assessment of methods used for the determination of sustainable yield

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2220	Constant rate test assessment	100	1	0	0	10,000	25%	0	OK	
2221	Step test assessment	100	1	0	0	10,000	25%	0	OK	
2222	Slug test assessment	100	1	0	0	10,000	25%	0	OK	
2223	Variable rate test assessment	100	1	0	0	10,000	25%	0	OK	
		400				40,000	100%	0	0%	Sustainable

224 Professional input for yield assessments

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2240	Adequate hardware and procedures has been employed in well test	100	1	0	0	10,000	33%	0	OK	
2241	Test analyses were found to be appropriate, consistent and well founded	100	0	0	0	10,000	33%	0	OK	
2242	Local or regional geological information was incorporated	100	1	0	0	10,000	33%	0	OK	
		300				70,000	200%	0	0%	Sustainable

225 Quality acceptance of water from scheme

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2250	Smell is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2251	Taste is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2252	Colour is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2253	Turbidity is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2254	Scaling is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2255	Staining is acceptable	100	1	100	1	10,000	14%	10,000	OK	
2256	Non-potable water sources are duly marked in 2 official languages	100	1	100	1	10,000	14%	10,000	OK	
		700				70,000	100%	70,000	100%	Sustainable

226 Cultural and social acceptance of source

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2260	The source of the scheme is culturally accepted	100	1	100	1	10,000	25%	10,000	OK	
2261	The source of the scheme is socially accepted	100	1	100	1	10,000	25%	10,000	OK	
2262	There is no preference for alternative sources	100	1	100	1	10,000	25%	10,000	OK	
2263	Downtime index (operational time / supposed working time)	100	1	90	1	10,000	25%	9,000	OK	
		400				40,000	100%	39,000	98%	Sustainable

227 Health - symptoms - AIDS/HIV CHECK!

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
2270	Nitrate poisoning of infants (<6 months) ("blue babies")	100	1	0	0	10,000	17%	0	OK	
2271	Percentage of community population having (black) stained teeth?	100	1	0	0	10,000	17%	0	OK	
2272	Cholera has occurred during the last 5 years	100	1	0	0	10,000	17%	0	OK	
2273	Open parameter	100	1	0	0	10,000	17%	0	OK	
2274	Open parameter	100	1	0	0	10,000	17%	0	OK	
2272	Open parameter	100	1	0	0	10,000	17%	0	OK	
		600				60,000	100%	0	0%	Sustainable

228 Water handling practices

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status

2280	Household water is being stored in closed containers	100	1	0	1	10,000	25%	0	OK
2281	Water is being transported in closed containers	100	1	0	1	10,000	25%	0	OK
2282	Water usage practices are deemed satisfactory from a sanitary point of view?	100	1	50	1	10,000	25%	0	
2283	Adequate community health practices training has been provided	100	1	50	1	10,000	25%	5,000	OK
		400				40,000	100%	5,000	13% Sustainable

229 Contamination risk assessment of on-site (dry) sanitation and wastewater disposal

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2290	Water sources are upstreams of sanitation facilities?								
2291	Is protective zone around sources according to regulations?	100	1	0	0	10,000	43%	0	OK
2292	Is sanitation integrated with water supply (%)?	100	0	0	1	10,000	43%	0	NO GO!
2293	Sanitation reservoirs lined?	30	1	0	1	3,000	13%	0	OK
2294	Open parameter	0	1	0	0	0	0%	0	OK
		230				23,000	100%	0	0% NOT sustainable

230 Effects of groundwater abstraction

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2300	No signs of aquifer water level depletion of other boreholes	100	1	100	1	10,000	25%	10,000	OK
2301	No signs of spring base flow depletion caused by borehole pumping	100	1	100	1	10,000	25%	10,000	OK
2302	No signs of stream base flow depletion	100	1	0	0	10,000	25%	0	OK
2303	No signs of borehole pumping causing water quality deterioration	100	0	0	0	10,000	25%	0	OK
		400				40,000	100%	20,000	50% Sustainable

231 Effects (potential) of soil erosion on water quality from aquifer

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2310	No signs of erosion on bedrock aquifer formation	100	1	0	1	10,000	50%	0	OK
2311	No erosional gullies onto exposed bedrock	100	0	0	1	10,000	50%	0	NO GO!
		200				20,000	100%	0	0% NOT sustainable

232 Water quality variations to consumers

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	KI-status
2320	No seasonal qualitative problems with: Rivers	100	1	0	0	10,000	17%	0	OK
2321	No seasonal qualitative problems with: Springs	100	1	0	0	10,000	17%	0	OK
2322	No seasonal qualitative problems with: Boreholes	100	1	0	0	10,000	17%	0	OK
2323	No seasonal qualitative problems with: Shallow wells	100	1	0	0	10,000	17%	0	OK
2324	No signs of flooding representing a threat to the integrity of the infrastructure?	100	1	0	0	10,000	17%	0	OK
2325	No signs of flooding affecting the water quality in any points?	100	1	0	0	10,000	17%	0	OK
		600				60,000	100%	0	0% Sustainable

233 Source(s) installation (excluding pumps & the source itself)

	ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
nt Condition"	2330	Pump/intake installations at source were operational at time of audit	100	0	50	1	10,000	50%	5,000	OK
	2331		100	0	50	1	10,000	50%	5,000	OK
			200				20,000	100%	11,000	55% Sustainable

234 Pump(s)

	ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
nt Condition"	2340	Pumps were operational at time of audit	100	1	50	1	10,000	25%	5,000	OK
	2341		100	1	50	1	10,000	25%	5,000	OK
	2342	Vital components can be changed within 48 hrs	100	1	10	1	10,000	25%	1,000	OK
	2343	Funds are available for replacement of vital components	100	0	0	1	10,000	25%	0	NO GO!
			400				40,000	100%	18,000	45% NOT sustainable

235 Transmission line(s), condition of

	ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
nt Condition"	2350	No parts of the pipeline is exposed	100	1	100	1	10,000	20%	10,000	OK
	2351	No leaks reported by WSP	100	1	0	1	10,000	20%	0	OK
	2352	No leaks observed by auditors	100	1	0	1	10,000	20%	0	OK
	2353	Damages to the pipeline is repaired within 48 hrs	100	1	100	1	10,000	20%	10,000	OK
	2354	Correct replacement articles in stock	100	1	0	1	10,000	20%	0	OK
			500				50,000	100%	20,000	40% Sustainable

236 Reservoirs, condition of

	ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
nt Condition"	2360	Assessment of the integrity of the tanks	100	1	20	1	10,000	17%	2,000	OK
	2361	Accessories such as floats, valves and fittings are functional	100	1	50	1	10,000	17%	5,000	OK
	2362	Operator is qualified and equipped to repair damages	100	1	0	1	10,000	17%	0	OK
	2363	Funds are available for replacement of vital components	100	1	0	1	10,000	17%	0	OK
	2364	Correct replacement articles in stock	100	1	0	1	10,000	17%	0	OK
	2365	No leaks have developed, nor likely to develop in the near future	100	1	0	1	10,000	17%	0	OK
			600				60,000	100%	7,000	12% Sustainable

237 Treatment plant(s), condition of

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2370	Plant was in operation at time of audit	100	1	0	0	10,000	33%	0	OK
2371	Accessories such as floats, valves and fittings are functional	100	1	0	0	10,000	33%	0	OK
2372	Chemicals are present	100	1	0	0	10,000	33%	0	OK
		300				30,000	100%	0	0% Sustainable

238 Treatment process(es)

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2380	Process is according to design	100	1	0	0	10,000	25%	0	OK
2381	Records of use of chemicals are being kept	100	1	0	0	10,000	25%	0	OK
2382	Operators are adequately trained for the job	100	1	0	0	10,000	25%	0	OK
2383	Chemicals are funded and procured by WSP	100	1	0	0	10,000	25%	0	OK
		400				40,000	100%	0	0% Sustainable

239 Reticulation system, condition of

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2390	System was operational at time of audit	100	1	90	1	10,000	33%	9,000	OK
2391	System is according to design								
2392	System conforms to standard pressure test (Q>10 L/MIN & P<900kpa)	100	1	0	0	10,000	33%	0	OK
2393	System conforms to SABS 0252 & SABS 0254	100	1	0	0	10,000	33%	0	OK
		300				30,000	100%	9,000	30% Sustainable

240 Meters (condition of-)

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2400	Water meters are operational	100	1	0	0	10,000	25%	0	OK
2401	Meter readings are recorded on a daily or weekly basis	100	1	0	0	10,000	25%	0	OK
2402		100	1	0	1	10,000	25%	0	OK
2403		100	1	0	1	10,000	25%	0	OK
		400				40,000	100%	0	0% Sustainable

242 Water metering

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2420	Monthly records from water metering are being kept	100	0	0	1	10,000	25%	0	NO GO!
2421	Tariffs are based on data from metering of water	100	0	0	1	10,000	25%	0	NO GO!
2422	Flow constraining mechanisms in place to regulate supply of water to consumers	100	0	0	1	10,000	25%	0	NO GO!
2423	Water meters conform to Trade Metrology (Act 77-1973)	100	0	0	1	10,000	25%	0	NO GO!
		400				40,000	100%	0	0% NOT sustainable

243 El metering

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	KI-status
2430	Electricity supply to pumps is subsidised from outside WSP	100	1	100	1	10,000	33%	10,000	OK
2431	Cost of electricity is budgetted as operational costs	100	1	100	1	10,000	33%	10,000	OK

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2432	EI subsidies are based on firm long term contracts	100	1	0	1	10,000	33%	0	OK	
		300				30,000	100%	20,000	OK	NOT sustainable

244 Water quality variations

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2440	No seasonal qualitative problems with: Rivers	100	1	100	1	10,000	17%	10,000	OK	
2441	No seasonal qualitative problems with: Springs	100	1	100	1	10,000	17%	10,000	OK	
2442	No seasonal qualitative problems with: Boreholes	100	1	100	1	10,000	17%	10,000	OK	
2443	No seasonal qualitative problems with: Shallow wells	100	1	100	1	10,000	17%	10,000	OK	
2444	Flooding does not represent a threat to the integrity of the infrastructure	100	1	100	1	10,000	17%	10,000	OK	
2445	Flooding does not affect the water quality in any points	100	1	50	1	10,000	17%	5,000	OK	
		600				60,000	100%	55,000	92%	Sustainable

245 Water service connections I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2450	Percentage of water service from Communal taps/points	100	1	100	1	10,000	33%	10,000	OK	
2451	Percentage of water service from Yard connections	100	1	0	1	10,000	33%	0	OK	
2452	Percentage of water service from House connections	100	1	0	1	10,000	33%	0	OK	
		300				30,000	100%	10,000	33%	Sustainable

246 Water service connections II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2460	Percentage of water service from Communal taps/points	100	1	100	1	10,000	33%	10,000	OK	
2461	Percentage of water service from Yard connections	100	1	0	1	10,000	33%	0	OK	
2462	Percentage of water service from House connections	100	1	0	1	10,000	33%	0	OK	
		300				30,000	100%	10,000	33%	Sustainable

247 Water service connections III

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2470	Percentage of water service from Communal taps/points	100	1	100	1	10,000	33%	10,000	OK	
2471	Percentage of water service from Yard connections	100	1	0	1	10,000	33%	0	OK	
2472	Percentage of water service from House connections	100	1	0	1	10,000	33%	0	OK	
		300				30,000	100%	10,000	33%	Sustainable

248 Mode of payment for water I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2480	Water is paid for on a PrePaid basis	100	1	0	1	10,000	25%	0	OK	
2481	Water is paid for on a Flat rate basis	100	1	100	1	10,000	25%	10,000	OK	
2482	Water paid for on a Per consumption basis	100	1	0	1	10,000	25%	0	OK	
2483	Water paid for on an Ad hoc basis	100	1	0	1	10,000	25%	0	OK	
		400				40,000	100%	10,000	25%	Sustainable

249 Mode of payment for water II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2490	Water is paid for on a PrePaid basis	100	1	0	1	10,000	25%	0	OK	
2491	Water is paid for on a Flat rate basis	100	1	100	1	10,000	25%	10,000	OK	
2492	Water paid for on a Per consumption basis	100	1	0	1	10,000	25%	0	OK	
2493	Water paid for on an Ad hoc basis	100	1	0	1	10,000	25%	0	OK	
		400				40,000	100%	10,000	25%	Sustainable

250 Mode of payment for water III

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2500	Water is paid for on a PrePaid basis	100	1	0	1	10,000	29%	0	OK	
2501	Water is paid for on a Flat rate basis	100	1	100	1	10,000	29%	10,000	OK	
2502	Water paid for on a Per consumption basis	50	1	0	1	5,000	14%	0	OK	
2503	Water paid for on an Ad hoc basis	100	1	0	1	10,000	29%	0	OK	
		350				35,000	100%	10,000	29%	Sustainable

251 Cost recovery as % of O&M running costs I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2510	What is cost recovery as % of O&M running costs?	100	1	0	0	10,000	50%	0	OK	
2511	What is cost recovery as % of O&M replacement costs?	100	1	0	0	10,000	50%	0	OK	
		200				20,000	100%	0	0%	Sustainable

252 Cost recovery as % of O&M running costs II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2520	What is cost recovery as % of O&M running costs?	100	0	20	1	10,000	50%	2,000	OK	
2521	What is cost recovery as % of O&M replacement costs?	100	1	0	1	10,000	50%	0	OK	
		200				20,000	100%	2,000	10%	Sustainable

253 Design water source

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2530	River: % of supply	100	1	0	1	10,000	25%	0	OK	
2531	Spring: % of supply	100	0	0	1	10,000	25%	0	NO GO!	
2532	Borehole: % of supply	100	0	100	1	10,000	25%	10,000	OK	
2533	Shallow well: % of supply	100	1	0	1	10,000	25%	0	OK	
		400				40,000	100%	10,000	25%	NOT sustainable

213 Actual water sources

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2130	River: % of supply	25	0	0	1	2,500	25%	0	NO GO!	
2131	Spring: % of supply	25	1	0	1	2,500	25%	0	OK	
2132	Borehole: % of supply	25	1	100	1	2,500	25%	2,500	OK	
2133	Shallow well: % of supply	25	1	0	1	2,500	25%	0	OK	
		100				10,000	100%	2,500	25%	NOT sustainable

254 Water contamination

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2540	No source(s) of contamination are identified in the area	100	1	50	1	10,000	20%	5,000	OK	
2541	No sullage and solid waste disposal arrangements in place	100	1	0	1	10,000	20%	0	OK	
2542	No geological conditions which may adversely affect groundwater quality	100	1	0	1	10,000	20%	0	OK	
2543	No contamination from sanitation considered to represent a water quality hazard	100	1	100	1	10,000	20%	10,000	OK	
2544	Percentage of population who considers contamination of water sources not a problem	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	15,000	30%	Sustainable

255 Preferred uses of water

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2550	Potable water including washing %	100	1	100	1	10,000	20%	10,000	OK	
2551	Gardening %	100	1	0	1	10,000	20%	0	OK	
2552	Livestock %	100	1	0	1	10,000	20%	0	OK	
2553	Business %	100	1	0	1	10,000	20%	0	OK	
2554	Other %	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	10,000	20%	Sustainable

256 Actual uses of water

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2560	Potable water including washing %	100	1	100	1	10,000	20%	10,000	OK	
2561	Gardening %	100	1	0	1	10,000	20%	0	OK	
2562	Livestock %	100	1	0	1	10,000	20%	0	OK	
2563	Business %	100	1	0	1	10,000	20%	0	OK	
2564	Other %	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	10,000	20%	Sustainable

257 Willingness to pay priority pattern

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2570	Allocation to school fees (%)	100	1	0	0	10,000	17%	0	OK	
2571	Allocation to electricity (%)	100	1	0	0	10,000	17%	0	OK	
2572	Allocation to water (%)	100	1	0	0	10,000	17%	0	OK	
2573	Allocation to telephone (%)	100	1	0	0	10,000	17%	0	OK	
2574	Allocation to transportation (%)	100	1	0	0	10,000	17%	0	OK	
2575	Allocation to beverages (%)	100	1	0	0	10,000	17%	0	OK	
		600				60,000	100%	0	0%	Sustainable

258 Actual spending priority pattern

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2580	Allocation to school fees (%)	100	1	77	1	10,000	17%	7,700	OK	
2581	Allocation to electricity (%)	100	1	0	1	10,000	17%	0	OK	
2582	Allocation to water (%)	100	1	3	1	10,000	17%	300	OK	
2583	Allocation to telephone (%)	100	1	0	1	10,000	17%	0	OK	
2584	Allocation to transportation (%)	100	1	13	1	10,000	17%	1,300	OK	
2585	Allocation to beverages (%)	100	1	7	1	10,000	17%	700	OK	
		600				60,000	100%	10,000	17%	Sustainable

259 Community support of scheme I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2590	The tariff structure is perceived as fair	100	1	70	1	10,000	17%	7,000	OK	
2591	The WSP management is perceived as being acceptable	100	1	40	1	10,000	17%	4,000	OK	
2592	The level of service is acceptable	100	1	90	1	10,000	17%	9,000	OK	
2593	The WSP provides acceptable public relations	100	1	20	1	10,000	17%	2,000	OK	
2594	Payments are being made out a "need to pay" basis	100	1	80	1	10,000	17%	8,000	OK	
2595	Payment being made out of fear of defaulting	100	1	0	1	10,000	17%	0	OK	
		600				60,000	100%	30,000	50%	Sustainable

260 Community support of scheme II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2600	The tariff structure is perceived as fair	100	1	100	1	10,000	17%	10,000	OK	
2601	The WSP management is perceived as being acceptable	100	1	20	1	10,000	17%	2,000	OK	
2602	The level of service is acceptable	100	1	100	1	10,000	17%	10,000	OK	
2603	The WSP provides acceptable public relations	100	1	20	1	10,000	17%	2,000	OK	
2604	Payments are being made out a "need to pay" basis	100	1	80	1	10,000	17%	8,000	OK	
2605	Payment being made out of fear of defaulting	100	1	0	1	10,000	17%	0	OK	
		600				60,000	100%	32,000	53%	Sustainable

261 Sense of ownership of scheme I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2610	The community was involved in the planning stage	100	0	100	1	10,000	25%	10,000	OK	
2611	The community was involved in the implementation stage	100	0	50	1	10,000	25%	5,000	OK	
2612	The community was involved in the establishment process of the WSP	100	0	100	1	10,000	25%	10,000	OK	
2613	The present WSP reflects community participation	100	0	100	1	10,000	25%	10,000	OK	
		400				40,000	100%	35,000	88%	Sustainable

262 Sense of ownership of scheme II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2620	The community was involved in the planning stage	100	0	100	1	10,000	25%	10,000	OK	
2621	The community was involved in the implementation stage	100	0	50	1	10,000	25%	5,000	OK	
2622	The community was involved in the establishment process of the WSP	100	0	100	1	10,000	25%	10,000	OK	
2623	The present WSP reflects community participation	100	0	100	1	10,000	25%	10,000	OK	
		400				40,000	100%	35,000	88%	Sustainable

263 Community involvement I

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2630	Community has been involved in planning re. level of service	100	0	0	1	10,000	17%	0	NO GO!	
2631	Community has been involved in planning re. Tariffs	100	0	0	1	10,000	17%	0	NO GO!	
2632	Community has been involved in planning re. O&M arrangements	100	0	0	1	10,000	17%	0	NO GO!	
2633	Community has been involved in planning re. choice of technology	100	0	0	1	10,000	17%	0	NO GO!	
2634	Community has been involved in planning re.mechanisms for conflic resolution	100	0	0	1	10,000	17%	0	NO GO!	
2635	Community has been involved in planning re. dealing with defaulters	100	0	0	1	10,000	17%	0	NO GO!	
		600				60,000	100%	0	0%	NOT sustainable

264 Community involvement II

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2640	Community has been involved in planning re. level of service	100	0	0	1	10,000	17%	0	NO GO!	
2641	Community has been involved in planning re. Tariffs	100	0	0	1	10,000	17%	0	NO GO!	
2642	Community has been involved in planning re. O&M arrangements	100	0	0	1	10,000	17%	0	NO GO!	
2643	Community has been involved in planning re. choice of technology	100	0	0	1	10,000	17%	0	NO GO!	
2644	Community has been involved in planning re.mechanisms for conflic resolution	100	0	0	1	10,000	17%	0	NO GO!	
2645	Community has been involved in planning re. dealing with defaulters	100	0	0	1	10,000	17%	0	NO GO!	
		600				60,000	100%	0	0%	NOT sustainable

266 Human resources: Required skills assessment (during implementation)

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2660	Skills required for O&M of scheme have been identified for training, including training costs	100	1	100	1	10,000	17%	10,000	OK	
2661	People to be trained has been identified by the community	100	1	100	1	10,000	17%	10,000	OK	
2662	Do the people to be trained have a long term interest in the future of the village?	100	1	100	1	10,000	17%	10,000	OK	
2663	Training for operation, maintenance and financial management is considered relevant	100	1	20	1	10,000	17%	2,000	OK	
2664	Regional institutions / local trained personnel to provide training have been identified	100	1	0	1	10,000	17%	0	OK	
		500				50,000	83%	32,000	64%	Sustainable

267 Human resources: Required skills assessment (during implementation)

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
2670	Skills required for O&M of scheme have been identified for training, including training costs	100	1	100	1	10,000	20%	10,000	OK	
2671	People to be trained has been identified by the community	100	1	20	1	10,000	20%	2,000	OK	
2672	Do the people to be trained have a long term interest in the future of the village?	100	1	70	1	10,000	20%	7,000	OK	
2673	Training for operation, maintenance and financial management is considered relevant	100	1	80	1	10,000	20%	8,000	OK	
2674	Regional institutions / local trained personnel to provide training have been identified	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

312 Compliance with Acts, strategies & regulations

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3120	Percentage of community served within legal max distance to water points?	100	1	100	1	10,000	20%	10,000	OK	
3121	Open parameter	100	1	20	1	10,000	20%	2,000	OK	
3122	Open parameter	100	1	70	1	10,000	20%	7,000	OK	
3123	Open parameter	100	1	80	1	10,000	20%	8,000	OK	
3124	Open parameter	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

313 Compliance with Acts, strategies & regulations

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3130	Percentage of community served within legal max distance to water points?	100	1	100	1	10,000	20%	10,000	OK	
3131	Open parameter	100	1	20	1	10,000	20%	2,000	OK	
3132	Open parameter	100	1	70	1	10,000	20%	7,000	OK	
3133	Open parameter	100	1	80	1	10,000	20%	8,000	OK	
3134	Open parameter	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

G12

314 Compliance with Acts, strategies & regulations

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3140	Percentage of community served within legal max distance to water points?	100	1	100	1	10,000	20%	10,000	OK	
3141	Open parameter	100	1	20	1	10,000	20%	2,000	OK	
3142	Open parameter	100	1	70	1	10,000	20%	7,000	OK	
3143	Open parameter	100	1	80	1	10,000	20%	8,000	OK	
3144	Open parameter	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

315 Compliance with Acts, strategies & regulations

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3150	Percentage of community served within legal max distance to water points?	100	1	100	1	10,000	20%	10,000	OK	
3151	Open parameter	100	1	20	1	10,000	20%	2,000	OK	
3152	Open parameter	100	1	70	1	10,000	20%	7,000	OK	
3153	Open parameter	100	1	80	1	10,000	20%	8,000	OK	
3154	Open parameter	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

316 Dependency On External Support Agencies

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3160	The financing of the water scheme is not reliant upon on external support agencies	100	1	100	1	10,000	20%	10,000	OK	
3161	The operation of the water scheme is not reliant upon external support agencies	100	1	20	1	10,000	20%	2,000	OK	
3162	The external support agency is fully integrated with the local government	100	1	70	1	10,000	20%	7,000	OK	
3163	External support agency exit strategy in place	100	1	80	1	10,000	20%	8,000	OK	
3164	External support is based on a firm long term contract	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

317 Dependency On External Support Agencies

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	Max W. Score	Normalised weights	Final score	Kf-status	
3170	The financing of the water scheme is not reliant upon on external support agencies	100	1	100	1	10,000	20%	10,000	OK	
3171	The operation of the water scheme is not reliant upon external support agencies	100	1	20	1	10,000	20%	2,000	OK	
3172	The external support agency is fully integrated with the local government	100	1	70	1	10,000	20%	7,000	OK	
3173	External support agency exit strategy in place	100	1	80	1	10,000	20%	8,000	OK	
3174	External support is based on a firm long term contract	100	1	0	1	10,000	20%	0	OK	
		500				50,000	100%	27,000	54%	Sustainable

318 Health, hygiene and sanitation

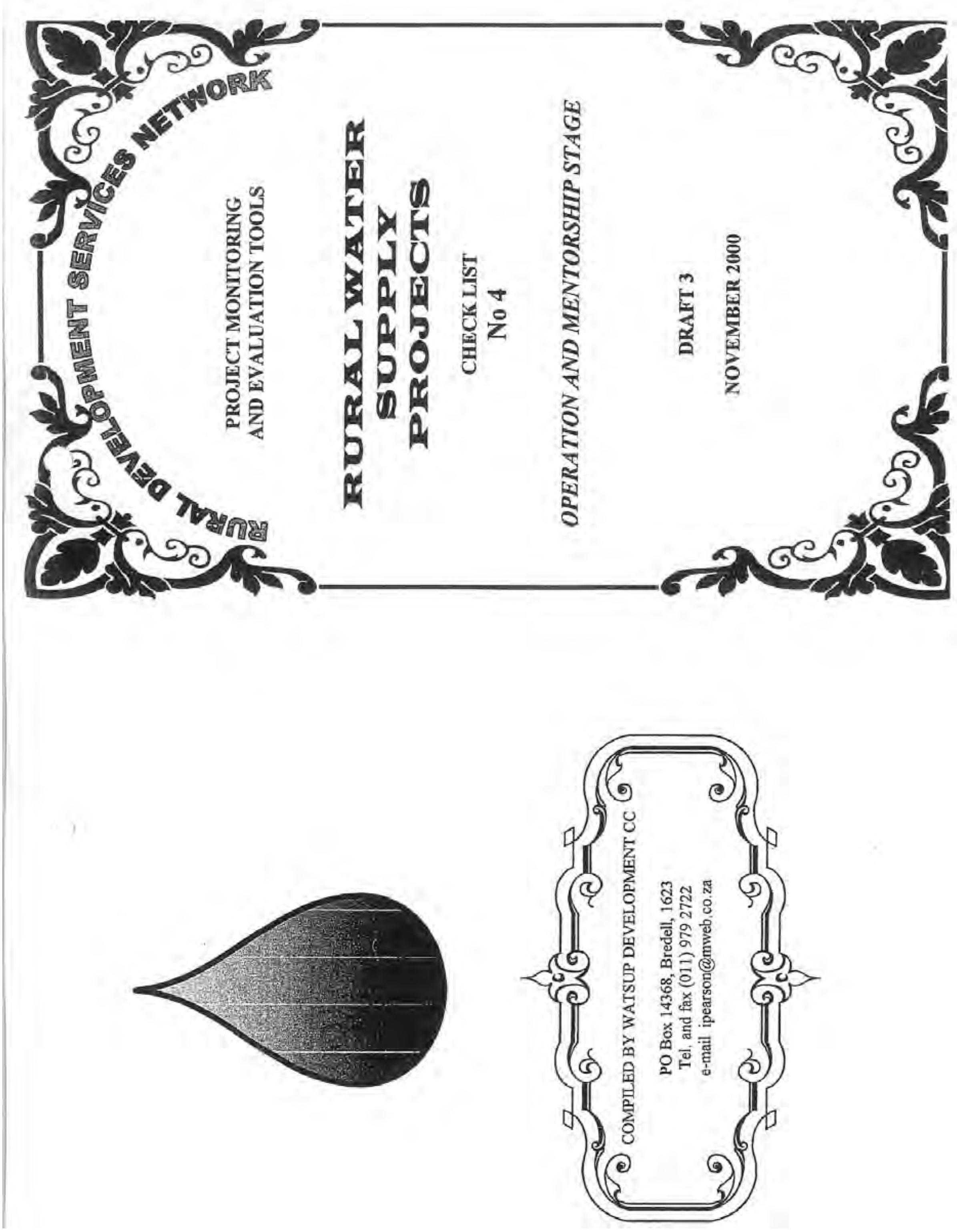
ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
3180	Hand washing routines are satisfactory	100	1	0	0	10,000	17%	0	OK	
3181	Community health & hygiene education has been provided	100	1	0	0	10,000	17%	0	OK	
2273	Awareness of link between hygiene and disease	100	1	0	0	10,000	17%	0	OK	
2273	Open parameter	100	1	0	0	10,000	17%	0	OK	
2274	Open parameter	100	1	0	0	10,000	17%	0	OK	
2272	Open parameter	100	1	0	0	10,000	17%	0	OK	
		600				60,000	100%	0	0%	Sustainable

319 Health, hygiene and sanitation

ID	INDICATOR	WEIGHT	Accept 0?	SCORE	Data?	w-score	Normalised weights	Final score	Kf-status	
3190	Hand washing routines are satisfactory	100	1	0	0	10,000	17%	0	OK	
3191	Community health & hygiene education has been provided	100	1	0	0	10,000	17%	0	OK	
2272	Awareness of link between hygiene and disease	100	1	0	0	10,000	17%	0	OK	
2273	Apparent standard of on site sanitation facilities	100	1	0	0	10,000	17%	0	OK	
2274	Open parameter	100	1	0	0	10,000	17%	0	OK	
2272	Open parameter	100	1	0	0	10,000	17%	0	OK	
		600				60,000	100%	0	0%	Sustainable

APPENDIX H

The Monitoring System developed by Ian Pearson of Watsup Development cc for RDSN



QUESTIONNAIRES AND CHECK LISTS
Project Operation and Mentorship

i. When to use these forms

These forms are for use during the operational stage of a project, i.e. while the scheme is being run and managed by the water services provider. They may be used to provide monitoring information on the operation of the scheme, and relate this back to the adequacy of planning and implementation.

ii. Aim of the questionnaires and check lists

The primary aims of these forms are as follows:

- to assess the impact of development;
- to support the implementation of projects and programs by providing comparable management information;
- to control costs on projects while ensuring that all aspects of the project are adequately addressed;
- to provide feed back data for the planning and design of new initiatives;
- to provide a basis for accountability in the use of development resources;
- to promote learning from experience;
- to strengthen and improve project planning, design and implementation;
- to stimulate partnerships with project stakeholders; and
- to highlight the outcomes of previous interventions, and the strengths and weaknesses of their implementation.

iii. Categories to be monitored

The following categories of information may be monitored during the O&M phase to ensure that the scheme is sustainable:

- Affordability levels and probable level of cost recovery:
  a) Affordability of tariffs
  b) Ability to pay
  c) Willingness to pay
  d) Effectiveness of tariff collection
  e) Level of financial management
  f) Tariffs vs financial needs of project
  g) Level of cost management
  h) Policy for non-payment

  Note that only sections c, d, e, f, and g are included in these forms for use during the O&M phase.

- Existing water supplies and optional new water sources
  a) Accessibility of water collection points
  b) Quality of the water
  c) Amount of water to be provided
  d) Demand for water
  e) Minimum water needs

  Note that all of these sections are included in these forms for use during the O&M phase..

- The WSP, and village water committee
  a) Acceptability of the institutional structures
  b) Acceptability of election or appointment methods
  c) Level of skills of PSC or VWC
  d) Level of involvement of key role players
  e) Level to which PSC or VWC carry out their responsibilities
  f) Level of participation by target groups

  Note that all of these sections are included in these forms for use during the O&M phase.

- The involvement and level of communication within the communities:
  a) Level of vandalism in the community
  b) Level of labour contribution
  c) Level of communication between the committee and the community
  d) Priority level for water in the community

  Note that only sections a, b, and c are included in these forms for use during the O&M phase..

- The appropriateness of the planned technological options:
  a) Level of skills required for O&M
  b) Level of adaptability to local conditions
  c) Level of employment creation and capacity building
  d) Acceptability by users
  e) Level of use of local water sources
  f) Level of use of local skills for O&M
  g) Level of environmental impact

  Note that only sections a, f, and g qre included in these forms for use during the O&M phase.

- The level of planning for breakdowns and to ensure reliability:
  a) Level of planning for disasters and breakdowns
  b) Level of external support available
  c) Comprehensiveness of O&M planning
  d) Level of spares maintained
  e) Availability of mentorship and after-care

  Note that all of these sections are included in these forms for use during the O&M phase.

Note that should any of the sections that are not included in this set of forms be required, they can be found in the general set of all forms (not specific to any particular project stage).

iv. Follow-up after the field visit

Note that the filling in of these forms should not be seen as the primary aim of monitoring and evaluation. The time and effort put into gathering this information should be carried through to using the information in a report on the project or scheme, and following up problem areas to ensure that these issues are dealt with as soon as practicable.

Each affiliate of the RDSN will develop their own reporting system, but a simple excel form is provided for recording the data from these surveys.

1. AFFOR_BILITY AND LEVEL OF COST RECOVERY

1c. Willingness to pay

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES	
Q – Are you satisfied with the water supply service?	1	Totally dissatisfied with level of service, reliability of supply, water quality and distance to collection points
	2	Partially satisfied (at least one of level of service, reliability of supply, water quality and distance to collection points is acceptable)
	3	Mostly satisfied (at least three of level of service, reliability of supply, water quality and distance to collection points is acceptable)
	4	Satisfied (all of level of service, reliability of supply, water quality and distance to collection points are acceptable)
	5	Fully satisfied (all of above acceptable, some beyond expectations)
1c1		
Q – Is the tariff fair?	1	Tariff unfair in terms of value for money, inequitable supply in community, inequitable costing relative to neighbouring villages/towns
	2	Tariff partially fair (at least one of value for money, equitable supply in community, equitable costing relative to neighbouring villages/towns is perceived as fair)
	3	Tariff mostly fair (a majority of residents consider the tariff to be fair in terms of at least two of value for money, equitable supply in community, equitable costing relative to neighbouring villages/towns)
	4	Tariff fair (most residents consider the tariff to be fair in terms of value for money, equitable supply in community, and equitable costing relative to neighbouring villages/towns)
	5	Tariff fully fair (all residents consider the tariff to be fair)
1c2		
Q/O – Do you have trust in the way your funds are managed?	1	No trust in financial management system
	2	Some trust in financial management system, but concerns voiced
	3	Mostly trustworthy financial management system
	4	Fully trustworthy financial management system
	5	Fully trustworthy financial management system with a proven history
1c3		

Other comments:

1d. Effectiveness of tariff collection

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – How many households are paying for the water?	$x = y$ % of all registered households
1d1	
Q – what is the breakdown of the unpaid accounts?	Payment history / No. households: Up-to-date; > 1 month behind; > 3 months behind; > 6 months behind
1d2	Sum of (no of households x months overdue)/total households
O – give impression of tariff collection set-up	Office easily accessible/people are well informed/accounts easily understandable/…
1d3	

Other comments:

1e. Effective financial management

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
O – Are the books up-to-date?	1 No financial record keeping at project or scheme level 2 Books available at project level, but inadequate and/or record keeping is far behind 3 Books available and records updated within past 3 months and/or reconciliation calculated within past 3 months 4 Good financial management with books available, up to date at end of previous month, and reconciliation calculated for previous month 5 Excellent financial management with all books up to date, reconciliations completed, and future financial planning regularly updated
1e1	

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – What is the planned monthly expenditure budgeted?	1 Monthly expenditure commitments well above income level 2 Monthly expenditure commitments above reasonable income expectations 3 Monthly expenditure commitments approximately match income 4 Monthly expenditure commitments below income level 5 Monthly expenditure commitments below income level and include acceptable longer term reserve fund
1e2	
Q/O – How are financial situations reported to the community?	1 No reporting – the community is unaware 2 Finances are reported verbally at community meetings (usually only when there are problems) 3 A written report is compiled, but only once per year and only given to a few leaders 4 Finances are reported regularly at community meetings and a report is made available to anyone who would like to see it. 5 As above, and the community makes recommendations and decisions on the financial aspects
1e3	
Q – what reserve or emergency fund has been established?	1 No reserve fund or not applicable 2 Reserve fund started with a few contributions, but no longer receiving contributions 3 Ongoing contribution to reserve fund, but at a slow rate and still far below target 4 Ongoing contribution to reserve fund at a rate that will achieve the target within the project time frame 5 Reserve fund has achieved target, and still receives ongoing contribution s
1e4	Type of fund: % contribution

Other comments:

1f. Tariffs vs financial requirements

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – Expected income if 100% payment of tariffs?	R .. /month
1f1	
Q – What realistic level of payment of tariffs is expected?	70-80%
1f2	

Q – what are the financial requirements budgeted for in the O&M tariff?

Cost item	R/month
Salaries	
Electricity and/or fuel	
Admin and bank costs	
Reserve fund contribution	
Chemicals (e.g. chlorine)	
Purchase of bulk water	
Transport	

1f3

Total costs per month:

Other comments:

1g. ost management programme

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – Who is responsible for cost control and management?	Treasurer/whole committee/clerk/no-body at the local level
1g1	

Q – what is the level of cost management being practised?

1	No cost management programme
2	Some cost management to maintain costs at expected level of income (but usually at the expense of staff wages or essential water supply costs e.g. pumping or treatment)
3	Cost control programme to ensure acceptable service provision and fair wages within expected level of income
4	Ongoing cost control programme to improve efficiency and effectiveness
5	Well managed cost control programme with a history of efficient service provision

1g2

Other comments:

2. WATER SUPPLY FACILITIES

2a. Accessibility of water collection point

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – what is the average distance from homes to the water collection points?	100m/200m/500m/yard taps/..
2a1	
Q/O – what is the maximum distance from homes to the water collection points?	100m/200m/500m/yard taps/..
2a2	
O – what are the state of the paths to the water collection points?	• Paths steep, uneven and dangerous for old people and small children when wet • Paths steep and uneven (no wheel barrows) but generally safe even when wet • Paths uneven (hazardous for wheel barrows) but not steep or dangerous • Good paths that are not steep and are accessible to wheel barrows • Good paths accessible by wheel barrows and motor vehioles
2a3	

Other comments:

2b. Quality water

Source: _____

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – what is the appearance and taste of the water supply?	• Muddy with pronounced taste • Murky and/or with pronounced taste • Slightly murky with slight earthy taste • Slightly murky but no taste • Clear with no taste
2b1	
Q – does the quality of the water change with the seasons?	Clearer in winter/muddy after rains/....
2b2	

Were water samples analysed for group A substances?

Indicator	Recommended	Measured value
Electrical conductivity	<150 mS/m	
Faecal coliforms	<10/100ml	
pH	4.5-9.5	
Turbidity	<1 NTU	
Free available chlorine	0.1 – 1.0 mg/l	

2b3 no. of substances within recommended limits / total number of substances measured

Were water samples analysed for group B substances?

Indicator	Recommended	Measured value
Nitrate & nitrite	< 20 mg/l	
Fluoride	< 1.5 mg/l	
Sulphate	< 400 mg/l	
Chloride	< 200 mg/l	
Arsenic	< 0.05 mg/l	
Total coliforms	< 100/100ml	

6b4 no. of substances within recommended limits / total number of substances measured

Other comments:

2c. Amount of water provided

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – how much water is provided in the water supply system to families each day?	• On average. 30-50 ℓ/c/d • On average <30 ℓ/c/d • On average >50 ℓ/c/d
2c1	
Q – how often do breakdowns occur?	• Daily • Weekly • Approx 1ce per month • Approx 1ce in 3 months
2c2	
Q - What are the causes of shortages and breakdowns?	• Pump failure • Lack of diesel or electricity • Pipe bursts • Institutional problems (e.g. operators not paid) • Insufficient water from the source
2c3	
Q - What is the duration of shortages and breakdowns?	• Usually < 1 day • Usually for 2 to 5 days • Usually > 5 days
2c4	
O – How much water is the source able to provide to the water supply system?	• Approx 50% of the water is still available • Only as much as is taken from the source • At least twice as much as is presently taken
2c5	

Other comments:

2d. Demand for water

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – how much water are families able to collect each day?	• As much as they need – on av. 30-50 ℓ/c/d • As much as they need – on average <30 ℓ/c/d • As much as they need – on average >50 ℓ/c/d • There are often shortages
2d1	
Q - Do households store water at home for use during shortages and breakdowns?	• Yes, sufficient for about 1 day • Yes, sufficient for 2 to 5 days • No, but collect water from other sources during breakdowns
2d2	
Q/O - What other water sources are available in the community?	• Springs • Handpump • Stream or river
2d3	
Q/O - How much water is collected from these other sources?	• All water except drinking water (about 75%) • All water but only during breakdowns • Those who can't afford the tariffs use this water
2d4	

Other comments:

2e. Minimum water needs

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – how much water are families using for drinking and cooking each day?	• On average 2 - 5 ℓ/c/d • On average 5 - 10 ℓ/c/d • On average > 10 ℓ/c/d
6e1	
Q - how much water are families using for washing and hygiene each day? (clothes, bodies, dishes, floors and surfaces, ..)	• On average 10 - 15 ℓ/c/d • On average 15 - 25 ℓ/c/d • On average > 25 ℓ/c/d
6e2	
Q - how much water are families using for other uses each day? (gardens, brick making, small business, ..)	• On average 10 - 15 ℓ/c/d • On average 15 - 25 ℓ/c/d • On average > 25 ℓ/c/d
6e3	

Other comments:

3. THE WATER SERVICES PROVIDER (WSP), OR VILLAGE WATER COMMITTEE

3a. Institutional structures acceptable to the community
(either WSP or village water committee)

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – how were the WSP members elected?	• Elected by vote at a community meeting • Appointed by the chief • Self appointed group of concerned residents • Appointed representatives of community water or sanitation committees
3a1	
Q/O - what is the make-up of the WSP?	• 30% women, the rest men • 50% women, 25% youth
3a2	
Q/O – do the WSP members represent specific groups, and do they report back regularly to these groups?	• No, they are just recognised leaders in the community • They represent ward areas and report back occasionally • They represent other committees and report back to these committees (e.g. health, gardens, development, ..) • They represent the communities from which they are sent, but do not report back to these communities
3a3	
Q/O – do WSP members attend WSP meetings regularly?	• About 80% of members attend regularly • Attendance is poor – less than 50% • Members only attend when "important" issues are to be discussed
3a4	
Q/O – are the WSP members well motivated and accountable?	• No, their primary interest are self enrichment • Partly, but they take little interest in the difficult issues requiring their attention • Yes, they report back to the community and bring responses from the community to mtgs • Yes, they take up challenges and initiate solutions to difficult issues.
3a5	

3a6. Average rating of acceptability:

Rating Value	Description (DWAF M&E system - rating for "Acceptability of PSC" KPI)
1	Not acceptable
2	Partially acceptable (meet RDP policy, representative, available, motivated) – at least one condition met
3	Mostly acceptable (meet RDP policy, representative, available, motivated) – at least 2 conditions met + partially in others
4	Fully acceptable in all aspects (meet RDP policy, representative, available, motivated)
5	Fully acceptable and provide additional benefits (e.g. links with local govt., additional skills, ...)

Other comments:

3b. WSP appointment methodology acceptable
(use same for village water committee)

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – were everyone in the community able to vote for WSP members?	• No, only selected community members • Yes, but not many attended the meeting • Yes, and the election meeting was well attended
3b1	
Q/O – What notification was given regarding the election?	• No notification was given • The community was invited by word of mouth • Written notification was given more than two weeks in advance
3b2	
Q/O – how did members vote?	• A show of hands in the general meeting • Group votes • Secret ballot
3b3	
Q/O – were the qualifications and job descriptions of the posts clearly described?	• No, nothing was said on this • The role of the WSP was described • The different WSP posts were described • Job descriptions and posts were described
3b4	

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – how many community members attended the election meeting?	• Only a few (<20) members attended • A small number (< 10% of the community) • An acceptable number (10 – 30%) • It was well attended (> 30%)
3b5	

3b6. Average rating of acceptability of WSP appointment methodology

Rating Value	Description
1	Not acceptable
2	Partially acceptable (open elections, sufficient prior notification, secret ballot, awareness of qualification requirements, awareness of job descriptions) – at least one condition met
3	Mostly acceptable (open elections, sufficient prior notification, secret ballot, awareness of qualification requirements, awareness of job descriptions) – at least 2 conditions met + partially in others
4	Fully acceptable in all aspects (open elections, sufficient prior notification, secret ballot, awareness of qualification requirements, awareness of job descriptions)
5	Fully acceptable and strongly motivated

3c WSP members have required capacity and skills
(use same for village water committee)

QUESTION (Q) OR OBSERVATION (O)		POSSIBLE RESPONSES
Q – what skills do WSP members have in order to perform their duties?		• running meetings • negotiation skills • financial management • planning • labour and manpower management • communication • some project management knowledge
3c1	1	Not acceptable
	2	Partially acceptable (running meetings, negotiation skills, financial management, planning, labour and manpower management, communication, and some project management knowledge) – at least capacity in two elements
	3	Mostly acceptable (running meetings, negotiation skills, financial management, planning, labour and manpower management, communication, and some project management knowledge) – at least capacity in four elements + partially in others
	4	Fully acceptable in all aspects (running meetings, negotiation skills, financial management, planning, labour and manpower management, communication, and some project management knowledge)
	5	Fully acceptable and strongly motivated

3d. Key role players involved and participating
(use same for village water committee)

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what other role players are involved in the project?	• the regional or district government offices of the Department of Water Affairs and Forestry • the Department of Health (EHOs) • the Local Government representative (TLC) • a representative of the traditional authority (e.g. chief or induna) • a representative of the district council
3d1	
Q/O – what is the level of involvement by other role players?	1. No involvement 2. Slight involvement (attend some meetings and offer some advice at the meetings) 3. Some involvement (attend all WSP meetings and actively participate in the meetings) 4. Full involvement (attend all WSP meetings and actively participate in the meetings, and also have some involvement in the planning and implementation of the project) 5. Full, motivated involvement (attend all WSP meetings and actively participate in the meetings, and also have significant involvement in the planning and implementation of the project)
3d2	

Other comments:

3e. Roles a :esponsibilities of role players effectively carried out
(use same for village water committee)

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what are the tasks and responsibilities of the WSP members?	• running meetings • negotiation of community level inputs • financial management • planning • labour and manpower management • communication to communities • some project management
3e1	
Q/O – what is the level of commitment and effectiveness of WSP members?	1 Not effective in carrying out responsibilities 2 Some impact of role players (improved effectiveness evident, but not sufficient) 3 Role players have a significant impact, with most planned activities being carried out, although generally not on time 4 Role players highly effective in carrying out planned and delegated tasks 5 Role players highly effective in carrying out planned and delegated tasks, and go beyond their responsibilities to improved the effectiveness of the project.
3e2	
QUESTION (Q) OR OBSERVATION (O)	**POSSIBLE RESPONSES**
Q/O – What is the level of leadership at community level	1 No leadership in committee or management team 2 Some leadership, but not directed or followed up 3 Elected or appointed leader who takes responsibility to ensure tasks are carried out 4 Active leadership by appointed leader and other role players who ensure effective and efficient carrying out of tasks 5 Active leadership by appointed leader and other role players who ensure effective and efficient carrying out of tasks, and take additional initiatives as and when required
3e3	

Other comments:

3f. Participation in planning and participation of tar groups
(use same for village water committee)

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – how many women are involved in management positions?	• 3 out of 10 WSP members • 2 out of 4 of the project management team

3f1	Chairperson		Secretary			
	Vice chair		Bookkeeper			
	Treasurer		Storekeeper			

Q/O – how many women are involved in all parts of the project?	• 3 out of 10 WSP members + • 2 out of 4 of the project management team + • 30 out of 60 employed labour + • 1 out of 5 small contractors
3f2	

QUESTION (Q) OR OBSERVATION (O)		POSSIBLE RESPONSES
Q/O – What is the level of participation by local institutional structures in planning and implementation	1	No involvement in planning, and only some involvement at strictly local labour issues
	2	Slight involvement in all local implementation aspects
	3	Full involvement in local project issues, including planning for operation and maintenance, with some consultation during business planning
	4	Full involvement in local project issues, including planning for operation and maintenance, as well as the planning stage, including the business plan
	5	Full, motivated involvement in all aspects of the project planning, implementation, operation and maintenance
3f3		

Other comments:

4. COMMUNITY INVOLVEMENT AND COMMUNICATION

4a. Minimum vandalism

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – What vandalism has occurred on the water or sanitation project?	• Some of the taps have been vandalised and we had to replace them • Some items were stolen from the stores • Some pipes were cut by residents unhappy with the water supply • There has been no vandalism
4a1	
Q - what is the approximate monthly or annual cost associated with vandalism?	R
4a2	

Other comments:

4b. Contribution of labour to reduce costs

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – has the community contributed labour to the project?	• No • Yes, but only a few residents • Yes, each household contributed one week of labour.
4b1	If yes, what was the labour used for:
Q/O – what is the estimated value of the labour contribution?	R
4b2	

Other comments:

4c. Ongoing communication with committee

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what communication happens between the committee (PSC and/or village committee) and the community?	• We hear from time to time from the committee representatives • We receive a report back at monthly community meetings • We engage our representatives regularly and ask questions regarding the project
4c1	
4c2 Average rating of communication with committee:	
1	No communication – community members unaware of project
2	Some communication through word of mouth
3	Communication of project through community meetings at monthly or less intervals
4	Regular communication through open community meetings and planned feedback structures
5	A high level of communication at community level with active feedback and strong participation by the community

Other comments:

5. THE A. .ROPRIATENESS OF THE TECHNOLOGY THAT HAS BEEN IMPLEMENTED

5a. O&M at Local Level

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – What level of skills is required for operation of the scheme?	• Diesel pump operator • Water treatment plant operator • Bookkeeper and treasurer • Tariff collection and issuing of accounts • Management of system
5a1	
Q - What level of skills is required for maintenance of the scheme?	• Diesel pump mechanic • Electrician • Plumbing and pipe fitting • General building and plastering
5a2	
Q - No. of local people trained for O&M?	
5a3	
5a4: Average rating of level of skills required for O&M	
1	High level of skills not available within the communities
2	Some local skills used for O&M, but sophisticated elements required external experts for maintenance
3	Most skills for O&M available within the communities, with infrequent requirement for external experts
4	All operation and maintenance tasks can be carried out by trained local community members
5	All operation and maintenance tasks can be carried out by trained local community members, with the skills being useful for other service provision and/or small business activities

Other comments:

5g. Environmental impact

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what impact have construction activities had on the environment?	• Construction included laying a pipeline through a portion of a sensitive wetland, but was covered up afterwards • There were some wastes from the construction site that may have polluted the soil and the water in the local stream.
5g1	
Q – what proportion of the water source will be used for the water supply scheme?	• Approximately 25% during the period of the lowest flow. • Approximately 80% of the safe yield of the borehole.
5g2	
Q – what other users utilise the same water source?	• Two communities use the stream downstream of this abstraction point. • The stream flows through a nature reserve
5g3	

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – Is there a risk of water pollution from pit latrines or storm-water runoff?	• Pit latrines are more than 50m from the borehole. • Storm-water collects all the rubbish and dumps it in the local stream
5g4	
Q – what other environmental impacts may result from the scheme?	• Threat to endangered species, their food chain or their habitat. • Threat to commercial species • Damage to a scenic area • Negative effect on quantity of surface water available to the ecology
5g5	

5f. Local skills to be used for implementation and O&M

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what local skills were used for the implementation of the water supply system?	• Local builders • Bookkeeping • Plumbers • Labour contractors
5f1	
Q – what local skills are to be used for the operation and maintenance of the water supply system?	• Pump operators • Bookkeeping • Plumbers
5f2	

Other comments:

5g6 Average rating of level of threat to sensitive eco-systems (DWAF M&E)	
1	No pollution of natural resources, no destruction of species habitat, no significant depletion of water resource required to sustain Eco-systems
2	No more than one of the following: • Construction within Eco-system but <5% of area, or <10% max flooding of Eco-system • Slight pollution, but only during construction, and not life threatening to any species. • Water resource abstracting between 5 and 15% of total available surface water during low-flow periods, or <50% safe yield of boreholes that exploit aquifers not being otherwise utilized.
3	No more than two of the above (2), or no more than one of the following: • Construction within Eco-system >5% but <15% of area, or <20% max flooding of Eco-system. • Some pollution, either during construction, and not life-threatening to any species, or minor pollution ongoing but intermittently and not life threatening to any species. • Water resource abstraction between 15 and 25% of total available surface water resource during low-flow periods, or >50% hut <75% safe yield of boreholes which exploit aquifers not being otherwise utilized.
4	No more than two of the above (3), or no more than two of the following: • Construction within Eco-system >25% but <40% of area, or >30% max flooding of Ecosystem. • Some pollution, either during construction, and not life-threatening to any species, or ongoing pollution but not life-threatening to any species. • Water resource abstraction between 25 and 5000 of total available surface water resource during low flow periods, or >75% sale yield of boreholes which exploit aquifers not being otherwise utilized.
5	More than two of the above (4), or any of the following: • Construction within Eco-system >40% of area, or >30% maximum flooding of Eco-system. • Significant pollution, either during construction and possibly life threatening to any species at the local level. or ongoing significant pollution with the possibility of being life threatening to any species at the local level. • Water resource abstraction greater than 50% of total available surface water resource during low-flow periods, or >75% safe yield of boreholes which exploit aquifers which are also important for other uses, including sustaining of the environment (e.g. springs)

5g7 Average rating of level of impact on water quality (DWAF M&E system)	
1	No pollution of local surface or ground water resources
2	No more than one of the following: • Dispersed pit latrines and/or waste dumpsites (>200m spacing), low ground water tab] (>10m), and ground water not exploited for drinking water. • Slight surface water pollution, but only during construction, and not exceeding maximum limit for waste load to stream. • Storm water drainage from dense settlement via maintained or grassed channels, and comprising less than 10% of total area draining into stream.
3	No more than two of the above (2), or no more than one of the following • Semi-dense pit latrines and/or waste dumps (100 —200m spacing) or dispersed septic tanks or digesters, ground water table >10m, and clayey or loam soil types. • Dispersed pit latrines, shallow ground water (1-10m), and clayey or loam soils. • Dispersed pit latrines, ground water table >10m, but sandy or fractured rock ground conditions. • Some surface water pollution, either during construction, and not exceeding maximum limit, or ongoing but not exceeding desirable limits. • Water drainage from dense settlement likely to carry additional silt load and human and animal wastes. and comprising less than 10% of total area draining into stream.
4	No more than two of the above (3), or no more than two of the following: • Very dense pit latrines and/or waste dumps (<100m spacing) or semi-dense septic tank digesters (100-200m spacing), ground water table >10m, and clayey or loam soils. • Semi-dense pit latrines or septic tanks, shallow ground water (1-10m), and clayey or loam soils. • Semi-dense pit latrines or septic tanks, shallow ground water table >10m, but sandy or fractured rock ground conditions. • Significant surface water pollution, either during construction and exceeding maximum limit, or ongoing but not exceeding maximum limits. • Water drainage from dense settlement likely to carry addition silt load and human wastes, and comprising 10-50% of total area draining into stream.
5	More than two of the above (4), or any of the following: • Very dense pit latrines and/or waste dumps (<100m spacing) or septic tanks of digest shallow ground water table (1-10m). • Very dense pit latrines or septic tanks, ground water table >10m, but sandy or fractured rock ground conditions. • Significant ongoing surface water pollution exceeding maximum limits. • Water drainage from dense settlement likely to carry additional silt load and human a animal wastes, and comprising >50% of total area draining into stream.

Other comments:

6. CONTINGENCY PLANS – ENSURING RELIABILITY

6a. Availability of plan to cope with disaster/breakdowns

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – Does the water services provider have documented contingency plans?	• They have an O&M manual • They have discussed it but it is not documented • Yes, there is a documented plan
6a1	
Q - what will happen in the event of a breakdown?	• Report to DWAF • Undertake maintenance as necessary, • Commission alternative (traditional) water sources
6a2	

6a3. Average rating of comprehensiveness of contingency plans:

Rating Value	Description
1	No contingency plans
2	Some planning for breakdowns (maintenance team contact details, reporting of breakdowns)
3	Some planning for breakdowns and alternative water supplies (reporting, maintenance, and re-commissioning of alternative (traditional) water sources)
4	Good detailed planning for breakdowns and use of alternative sources
5	A high level of contingency planning for breakdowns, protection and use of alternative sources, and disaster plans (e.g. floods and drought)

Other comments:

6b. Availa ty of contact list or network for specialist support

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – does the water services provider have a list of contacts for specialist support?	• No • Yes, but only for one or two specialists • Yes, including all needed institutions.
6b1	
Q/O – Which organisations are included on the contact list?	• Project agents • Pump suppliers • All other material and equipment suppliers • Regional government offices • Implementing agent • Provincial government offices
6b2	

Other comments:

6c. Comprehensive O&M plan

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what planning has been carried out in terms of O&M?	• Operation of pumps • Operation of treatment works • Accounts and tariff collection • Maintenance of pipelines & reservoirs • Protection of the water source
6c1	
Q/O – Does the WSP have an O&M manual?	
6c2	

6c3	Average rating of comprehensiveness of O&M plans:
1	No O&M plan
2	Some planning e.g. operation of pumps
3	O&M plans include pump operation and maintenance, maintenance of pipelines and reservoirs, and basic cost recovery
4	Good detailed planning for O&M including pump operation and maintenance, maintenance of pipelines and reservoirs, tariff policy and cost recovery, role-player involvement, unauthorised connections, and water service provider institutional set up.
5	A high level of O&M planning for all the above aspects

Other comments:

6d. Minimum Level of Spares Maintained

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q/O – what spares are kept in the store? (and their approximate value?)	• Tap washers • Pump seals • Pipe sections and joints • Cement • Diesel engine filters
6d1	
Q/O – what is the approximate (or expected) annual budget for repairs and replacements?	• R 500 for parts and R 1000 for labour • R5,000 for contractors
6d2	

Other comment:

6e. Availability of Mentorship Programme/After-care

QUESTION (Q) OR OBSERVATION (O)	POSSIBLE RESPONSES
Q – what mentorship programme has been planned or has been implemented?	• IA has 2 year mentorship contract to ensure good O&M and skills development; • Project agent visits projects from time to time (no fixed contract); • DWAF field workers visit on occasions
6e1	
Q/O – what is the level of mentorship and after-care?	1 No mentorship or after-care programme 2 Mentorship to be provided by district officials who have had minimal involvement in the project 3 After-care to be provided as needed or requested by the WSP from the project agents 4 Planned regular mentorship visits and tasks by project agents over at least a 1 year period 5 Planned regular mentorship visits and tasks by project agents and regional government officials over a 2 or more year period
6e2	

Other Comments:

SUMMARY OF INDICATORS

1. Affordability and level of cost recovery

Indicator	Description	Value
Affordability of tariffs	tariff as % average monthly disposable income	1a1/1a6 x 100 %
	tariff as % poverty datum (bread line) for region (for a family of 6)	1a1/1a7 x 100 %
	poverty index	1a6/1a7
	affordability index	$1a1/(1a6/1a7)^2$
Ability to pay	average financial commitments	$\frac{[(1b1x1b3/100)+1b2+(1b4x2)]}{1a6x100}$
	water tariff as % financial commitments (debt)	$\frac{1a1 \times 100}{[(1b1x1b3/100)+1b2+(1b4x2)]}$
	community qualitative perception of ability to pay	1b5
Willingness to pay	level of satisfaction with service provided (or to be provided)	1c1
	perceived fairness of tariff	1c2
	level of trust in financial management system	1c3
	willingness to pay index	(1c1+1c2+1c3)/3
Effective financial management	books up to date	1e1
	planned expenditure below income	1e2
	open and transparent reporting	1e3
	adequate reserve fund	1e4
	financial management index	(1e1+1e2+1e3+1e4)/4
Cost management	Level of cost management	1g2

2. Water supplies and sanitation facilities

Indicator	Description	Value
Accessibility of water collection point	Average distance from households	2a1
	Maximum distance from households	2a2
	Quality of access paths to water collection points	2a3
Quality of water	average quality of group A substances	2b3 = (no. samples within recommended limits) ÷ (no samples)
	average quality of selected group B substances (e.g. groundwater)	2b4 = (no. samples within recommended limits) ÷ (no samples)
	community perception of quality of water	2b1 & 2b2 (as number of different but valid concerns)
Amount of water provided	Amount of water provided	2c1
	Reliability of water supply scheme	2c2 and 2c4
	Causes of failure	2c3
Demand for water	Average water consumption from scheme	2d1
	Estimated average water obtained from other sources	2d4
Minimum water needs	Minimum water needs	2e1+2e2+2e3

3. The WSP, village water and/or sanitation committee

Indicator	Description	Value
Structures acceptable to the community	Acceptability of the PSC	3a6
	Acceptability of village water and/or sanitation committee (if different from the PSC)	3a6

Indicator	Description	Value
WSP appointment methodology acceptable	Acceptability of WSP appointment methodology	3b6
	Community involved in election of members	3b5
WSP members have required capacity and skills	Level of skills of PSC.	3c1
Key role players involved and participating	Level of involvement of role players	3d2
Roles and responsibilities of role players effectively carried out	Level of commitment and effectiveness of role players	3e2
Good leadership	Level of leadership at community level	3e3
Active involvement of women	Women in management positions	3f1
	Women in all project activities	3f2

4. Community involvement and communication indicators

Indicator	Description	Value
Minimum vandalism	Level of vandalism	4a2
Contribution of labour to reduce costs	Value of labour contribution	$\frac{4b2 \times 100}{\text{total labour cost}}$
Ongoing communication with committee	Level of communication with PSC and/or community committee.	4c2

5. The appro[illegible]ateness of the water supply technology implemented

Indicator	Description	Value
O&M at Local Level	Level of skills required for O&M	5a4
	No. of local people trained for O&M	5a3
Local skills used for implementation and O&M	Number of locally skilled labourers used in implementation	5f1
	Number of locally skilled labourers to be used in operation & maintenance	5f2
Environmental impact	Level of threat to eco-systems	5g6
	Level of impact on water quality	5g7

6. Contingency plans – ensuring reliability indicators

Indicator	Description	Value
Availability of plan to cope with disaster/breakdowns	WSP has plans for breakdowns	6a1
	Level of comprehensiveness of plans	6a3
Comprehensive O&M plan	Comprehensiveness of O&M plan.	6b3
Availability of contact list or network for specialist support	Contact list available	6c1
	Number of institutions or agencies on list	6c2
Minimum Level of Spares Maintained	% estimated annual spares budget	6d1/6d2 x 100
Availability of Mentorship Programme/After-care	Mentorship and after-care programme planned?	8e1
	Level of mentorship and after-care programme	8e2

APPENDIX I

The WSP audit requirements of the Water Services Act, as summarised by Ramsden

I1

REGULATIONS RELATING TO COMPULSORY NATIONAL STANDARDS AND MEASURES TO CONSERVE WATER
Under sections 9(1) and 73(1)(j) of the Water Services Act, 1997 (Act No. 108 of 1997)

WATER SERVICES AUDIT

10(1) A water services authority must, within four months after the end of each financial year, undertake a water services audit.
(2) A water services audit must contain details for the previous financial year and, if available, comparative figures for the preceding two financial years of –

	UNIT OF MEASURE	PRIORITY
The quantity of water services provided		
(i) the quantity of water used by each user sector;		
(ii) the quantity of water provided to the water services institution by another water services institution;		
(iii) the quantity of effluent received at sewage treatment plants;		
(iv) the quantity of effluent not discharged to sewage treatment plants and approved for use by the water services institution;		
The levels of services rendered		
(i) the number of user connections in each user sector;		
(ii) the number of households provided with water through communal water services works;		
(iii) the number of consumers connected to a water reticulation system where pressures rise above 900 kPa at the consumer connection;		
(iv) the number of households provided with sanitation services through consumer installations connected to the sewerage system;		
(v) the number of households with access to basic sanitation services;		
(vi) the number of new water supply connections made; and		
(vii) the number of new sanitation connections made;		
the numbers provided in compliance with paragraph (b) expressed as a percentage of the total number of connections or households;		
Cost recovery		
(i) the tariff structures for each user sector;		
(ii) the income collected expressed as a percentage of total costs for water services provided;		
(iii) unrecovered charges expressed as a percentage of total costs for water services provided;		
Progress with meter installation and meter testing		
(i) the number of new meters installed at consumer installations; and		
(ii) the number of meters tested and the number of meters replaced expressed as a percentage of the total number of meters		

	UNIT OF MEASURE	PRIORITY
installed at consumer connections;		
The water quality sampling programme contemplated in regulation 5(1), the results of the comparison set out in regulation 5(3) and any occurrence reported in compliance with regulation 5(4);		
Suitable programme for sampling the quality of potable water provided by it to consumers		
Comparison of the results obtained from the testing of the samples with SABS 241: Specifications for Drinking Water, or the South African Water Quality Guidelines published by the DWAF		
Indicate if the water supplied poses a health risk.		
Water related diseases reported to local health institutions;		
Water conservation and demand management		
(i) Results of the water balance		
Quantity of unaccounted for water by comparing the measured quantity of water provided to each supply zone with the total measured quantity of water provided to all user connections within that supply zone;		
Quantity of water supplied but not discharged to sewage treatment plants		
(ii) the total quantity of water unaccounted for;		
(iii) the demand management activities undertaken;		
(iv) the progress made in the installation of water efficient devices.		

APPENDIX J

The Alfred Nzo District Municipality's rural water monthly reporting system, as produced by Maluti GMS.

4. Water Supply Summary for Umzimvubu North

(Reports from Community Based Water Service providers)

Ward 32

Village	Scheme	Pop	Quality (e-coli/100ml)	Quantity (% of FBW)	Continuity (% operating)	Cost (% of budget)	Repairs (description)	ISD (meetings)	Incident (number)	San (report)	Comment
Phalani		2,142	no sample	refub	28 (refurb)	95	refub	accept	refub	no service	new project for SSA
Epiphany		3,564	no sample	refurb	100	105	refurb	accept	refurb	no service	new project for SSA
Lukholweni	n/a	4,098	[illegible]	no shortage	98	68	pipe repairs	good	[illegible]	no service	
Sidakeni	n/a	1,566	0/0/0	no shortage	99	65	none	good	none	no service	
Emyamaneni	Hillside	1,278	0	no shortage	100	62	none	good	none	no service	
Ezitapile	n/a	1,656	no service	no service	no service	no service	no service	no service	no service	no service	
Rolweni	Myemaneni	606	0	no shortage	100	82	none	good	none	no service	
Mrwabo		960	no service	no service	no service	no service	no service	no service	no service	no service	
Nkungwini	n/a	780	no service	no service	no service	no service	no service	no service	no service	no service	
Mjikelweni	Myemaneni	144	0	no shortage	100	82	none	good	none	no service	
eMoyeni	Nyaniso	1,800	6/0/0	no shortage	100	75	tank covered	good	none	no service	
Ezimpampareni A		186	0	no shortage	100	75	none	good	none	no service	
Ezimpampareni B		486	no service	no service	no service	no service	no service	no service	no service	no service	
Bubesi B	Bubesi	1,626	0/0/2	no shortage	100	73	new tank	good	none	no service	
Bubesi A	Bubesi	918	2/0	no shortage	100	73	none	good	none	no service	
Kwaqili		1,476	0	no shortage	100	62	pipe repairs	good	none	no service	
Emaxesibeni	n/a	822	no service	no service	no service	no service	no service	no service	no service	no service	
Bamanzi	n/a	1,656	0	no shortage	100	150	none	good	[illegible]	no service	
Fiva	n/a	774	0	no shortage	100	150	none	good	none	no service	

Number of villages =	19	Population est=	26,538	Population est =	26,538
Villages served =	14	Pop served (H2O) =	21,834	Pop served (San) =	0
Percentage served =	74	Percentage served =	82	Percentage served =	0

Good = Acceptable = Bad = No service = no service

MASAKALA (June 2002)

1 GENERAL

1.1. The prepaid system is management and maintenance intensive.
1.2. The local operators are very active at this project.
1.3. All meter readings have been taken and reported.
1.4. Spare parts are not freely available since the use of prepaid systems is limited.
1.5. A supply point has been installed at a tourism project guest house.
1.6. Overall consumption = 2.5 l/c/day (approx). 68% of taps operational.
1.7 Prepaid system has been changed to a normal tap using token as a key.

2 INSTITUTIONAL DEVELOPMENT

2.1. The implementation of the interim arrangements for the provision of FBW has been successful.
2.2. The implementation of the VLAP of Alfred Nzo DM is underway.
2.3. A detailed sanitation report was submitted (28% of homes have toilets)
2.4. Monthly reports have been submitted

3 WATER QUALITY

3.1. **Bactreiological Analysis: (see attached report)**
The e-coli count has been consistently low at all three sources.
The total coliform count hasbeen acceptable
3.2. **Chemical Analysis: (see attached report)**
Water found to be acceptable in test conducted in November 2001.

4 WATER SUPPLIED pop = 5000

4.1.

	supply (kl)	consumption (kl)	l/c/day (l)	UFW (l/km/hr)	UFW (%)	Number of street taps	Number of priv taps	Number of leaking	% of taps (working)
Masakala	209	209	9	n/a	n/a	18	0	0	18
Khohlong	100	100	25	n/a	n/a	15	0	0	15
Kho/Spring	38	38	17	n/a	n/a	3	0	0	3
New Stands	225	225	8	n/a	n/a	22	1	0	23
Tsepisong	374	374	16	n/a	n/a	29	0	0	29

4.2. **Supply Interruptions:**
4.2.1 Prob'em of the borehole pupm station no 1 sinking.

5 REPAIRS AND FAULTS

5.1. Incidents of vandalism =	0
5.2. Number of leaks repaired =	5
5.3. Number of other maintenance jobs completed =	2

6 FINANCIAL REPORT

6.1.

Expenditure (Rands)	total budget	this month	total to date	% of budget	% time elapsed
labour	5,280.00	1,320.00	1,320.00	25.00	1 month of 4
admin (wsp)	n/a	0.00	0.00	#VALUE!	1 month of 4
material	n/a	0.00	0.00	#VALUE!	1 month of 4
energy	n/a	0.00	0.00	#VALUE!	1 month of 4
Total	5,280.00	1,320.00	1,320.00	25.00	1 month of 4
cost/kl	n/a	n/a	n/a	n/a	1 month of 4
cost/ person	n/a	0.26	0.26		1 month of 4
cost / h-hold	n/a	1.58	1.58		1 month of 4

Income (Rands)	total budget	this month	total to date	% of total	% time elapsed
municipality	5280	1,320.00	1,320.00	25.00	1 month of 4
tariff collection	0.00	0.00	0.00	#DIV/0!	1 month of 4
Total	5280	1,320.00	1,320.00	25.00	1 month of 4

7 PERSONNEL

	rate	number	total cost
operators	350.00	3	1,050.00
bookkeepers	135.00	2	270.00
wsp members	n/a	0	n/a
hours worked		n/a	
safety incidents		n/a	

8 TOOLS AND EQUIPMENT

8.1. Adequate tools (one toolbox missing)
8.2. Spare not freely available (temporarily bypassed mechanism system)

J3

MASAKALA (Meter Readings)

POP	VILLAGE	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02
	MASAKALA						
771	Bulk		4,481	4,640	4,863	5[illegible]072	
	Tap 1					44	
	Tap 2					11	
	Tap 3					[illegible]557	
	Tap 4					[illegible]343	
	Tap 5					[illegible]239	
	Tap 6					14	
	Tap 7					[illegible]407	
	Tap 8					[illegible]511	
	Tap 9					[illegible]235	
	Tap 10					[illegible]336	
	Tap 11					[illegible]262	
	Tap 12					[illegible]153	
	Tap 13					[illegible]236	
	Tap 14					[illegible]282	
	Tap 15					[illegible]273	
	Tap 16					[illegible]234	
	Tap 17					[illegible]867	
	Tap 18					379	
	Total					5[illegible]383	
	TSEPISONG						
771	Bulk		9,660	9,927	10,285	10[illegible]659	
	Tap 1					724	
	Tap 2					[illegible]513	
	Tap 3					[illegible]441	
	Tap 4					621	
	Tap 5					1	
	Tap 6					395	
	Tap 7					934	
	Tap 8					4	
	Tap 9					543	
	Tap 10					362	
	Tap 11					934	
	Tap 12					443	
	Tap 13					264	
	Tap 14					159	
	Tap 15					211	
	Tap 16					788	
	Tap 17					447	
	Tap 18					365	
	Tap 19					250	
	Tap 20					660	
	Tap 21					289	
	Tap 22					2	
	Tap 23					610	
	Tap 24					310	
	Tap 25					23	
	Tap 26					409	
	Tap 27					250	
	Tap 28					1,022	
	Tap 29					662	
	Total					[illegible]2 636	

J4

	KHOHLONG					
771	Bulk	1,749	1,749	1,749	1,749	
	Tap 1				284	
	Tap 2				93	
	Tap 3				112	
	Tap 4				103	
	Tap 5				304	
	Tap 6				494	
	Tap 7				225	
	Tap 8				32	
	Tap 9				7	
	Tap 10				460	
	Tap 11				19	
	Tap 12				218	
	Total				2,351	
	SPRING					
75	Bulk	228	248	293	331	
	Tap 1				542	
	Tap 2				119	
	Tap 3				248	
	Total				909	
	NEW STANCE					
900	Bulk	5,711	5,833	6,092	6,316	
	Tap 1				182	
	Tap 2				1,459	
	Tap 3				317	
	Tap 4				92	
	Tap 5				56	
	Tap 6				119	
	Tap 7				691	
	Tap 8				635	
	Tap 9				77	
	Tap 10				432	
	Tap 11				544	
	Tap 12				251	
	Tap 13				731	
	Tap 14				539	
	Tap 15				418	
	Tap 16				646	
	Tap 17				923	
	Tap 18				531	
	Tap 19				318	
	Tap 20				170	
	Tap 21				435	
	Tap 22				35	
	Total				9,601	

	MASAKALA		4,481	4,640	4,863	5,072	
	TSEPISONG		9,660	9,927	10,285	10,659	
	KHOHLONG		1,749	1,749	1,749	1,749	
	KHO/SPRING		228	249	293	331	
	NEWSTANCE		5,711	5,833	6,092	6,316	
3288	"SUM"		21,829	22,398	23,282	24,127	
	CONSUMPTION		-3,969	569	884	845	

MASAKALA (Village Consumption)

ALLOC	VILLAGE	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02
578	MASAKALA		138	159	223	209	
578	TSEPISONG		161	267	358	374	
578	KHOHLONG		0	0	0	0	
56	SPRING		*9*	*21*	*44*	*38*	
675	NEW STANDS		68	122	259	225	
	TOTAL (kl)		376	569	884	845	
	ALLOCATION (kl)		2,466	2,466	2,466	2,466	

MASAKALA (Consumption per Capital)

ALLOC	VILLAGE	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02
25	MASAKALA		6	7	10	9	
25	TSEPISONG		7	12	15	16	
25	KHOHLONG		0	0	0	0	
25	SPRING		4	9	20	17	
25	NEW STANDS		3	5	10	8	
	AVERAGE (l/c/d)		4	6	9	9	

MALUTI SSA
MONTHLY PROJECT O&M PROGRESS REPORT
Scheme: Masakala
Month MAY **2002**

Supply & Quality of Water/*Ubumjani Bamanzi*

Supply of Water *Ukufumaneka kwamanzi*	POOR *IMBI*	GOOD *IBHETELE*	EXCELLENT *INTLE KAKHULU*
Visual Quality of Water *Inkangeleko yamanzi*	MUDDY *LUDAKA*	MURKY *AMDAKA*	CLEAR *ACACILE*
Taste of Water *Incasa yamanzi*	SALTY *ANETYUWA*	CHLORINE *IKLORINE*	PURE *ACOCEKILE*

Taps Operational/*Ompompi abasebenzayo*

Village *Ilali*	Total number of Street taps *Inani leetephu Ezisestrateni*	Total number of Private tapstands *Inani leetephu ezisemakhaya*	# Taps with no water *Inani leetephu ezingaphumi manzi*	# Taps leaking *Inani leetephu ezivuzayo*	# Taps working *Inani leetephu ezisebenzayo*
Masakala	18				
Khohlong					
Tsepisong					

Tap Flow Rates/*Indlela amanzi aphuma ngayo*

Village *Ilali*	# Of taps taking longer than 1 minute to fill a 10L bucket *Inani leetephu elithatha ngapha komzuzu omny ukugcwalisa i10L yepail*	Comments
Masakala		
Khohlong		
Tsepisong		

Record of Interruption of Supply/*Ukuphazamiseka kwendlela aphuma ngayo*

Place	Date	How long	Reason	Comment

Record of Consumption/*Ukubalwa kwamanzi*

Village *Ilali*	TANK SIZES	Ref #	This month's reading *Ubalo lwalenyanga*	Previous month's reading *Ubalo lwenyanga edlulileyo*	Total No. of KL used *Inanai leKL ezisebenzile*

Monitoring the use of FBW/*Ukulawulwa kwamanzi amahala*

Village *Ilali*	Monthly FBW Allowance *Imvume yenyanga YeFBW*	Actual Consumption *Eyona ntsebenzo*	% use of FBW allocation Inani lemvume Lokusetyenziswa Yi FBW
Masakala			
Khohlong			
Tsepisong			

Repairs and Faults/*Izinto ezonakeleyo*

Village *Ilali*	Bulk Supply Line	Village Retic.	Taps	Comments Izikhalazo
Incidence of vandalism				
# leaks repaired				
Pipe protection				
Structural repairs				
Power failures/ pumps				

Financial Report/*Ingxelo yemali*

RECORD OF INCOME		
Date	Description	Amount
	TOTAL INCOME RECEIVED	

RECORD OF EXPENDITURE		
Date	Description	Amount
	TOTAL EXPENDITURE	

Balance Brought Forward from the previous month	
Plus Income	
Less Expenditure	
Balance as per Cash Book	
Balance as per Bank Book	
Plus Cash on Hand	
Balance	

Health Report/*Ingxelo yezempilo*

Use of traditional water sources for the use of :/*Ukusetyenziswa kwamaziko akudala*

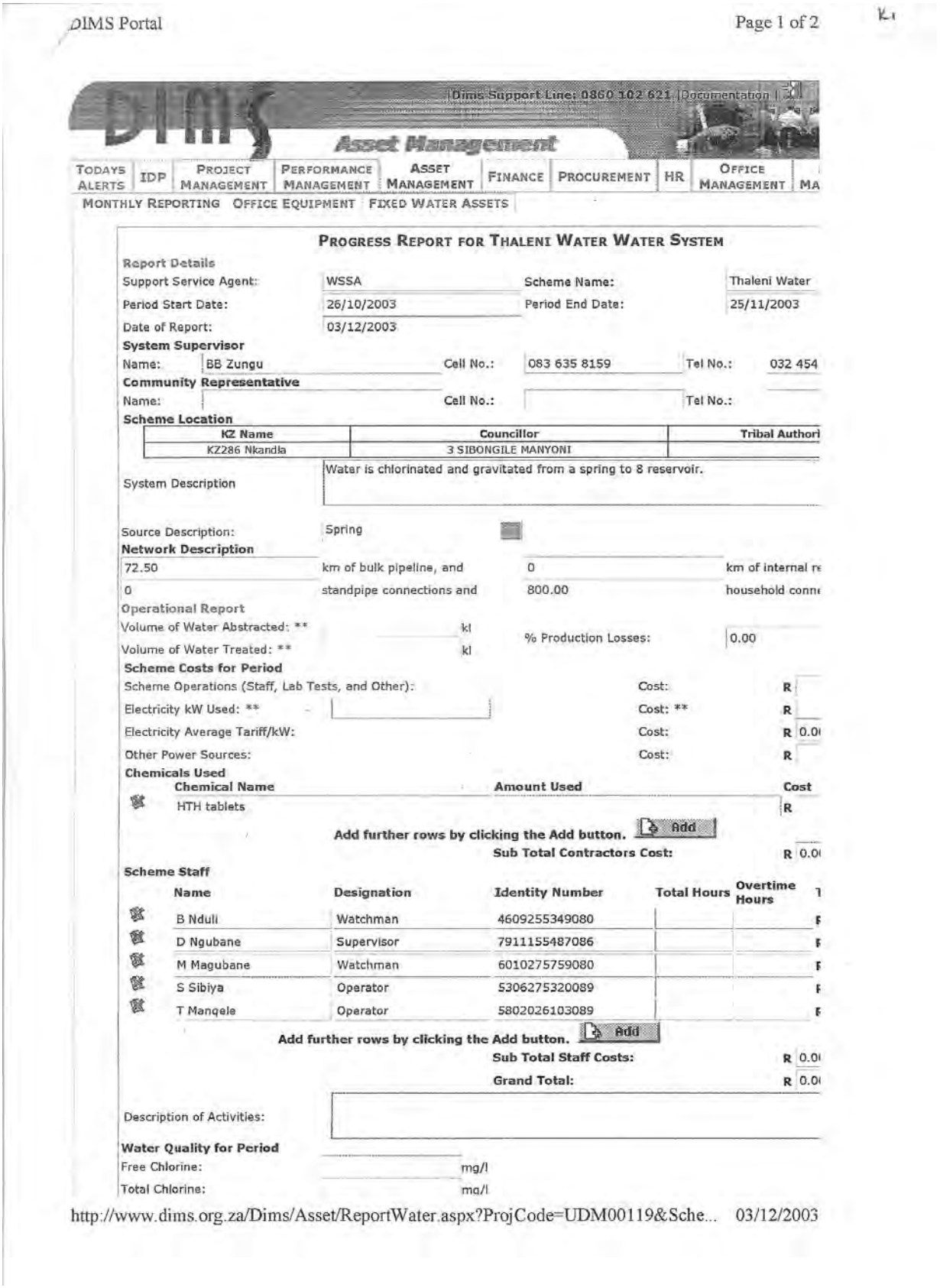
Village *Ilali*	Drinking *Awokusela*	Washing *Awokuhlamba*	# reported cases of diarrhea *Inani lezisu Ezihambisayo*
Masakala	YES	YES	none
Khohlong	YES	YES	none
Tsepisong	YES	YES	none

Record of poor sanitation facilities affecting the community/*Ingxelo yococeko Echaphazela abahlali*

Village *Ilali*	Comments
Masakala	
Khohlong	
Tsepisong	

APPENDIX K

A typical Asset Management Report from the District Information Management System (DIMS) produced by Intermap – this is customized according to the municipality's requirements.



DIMS Portal Page 1 of 2

DIMS Dims Support Line: 0860 102 621 | Documentation |

Asset Management

TODAYS ALERTS | IDP | PROJECT MANAGEMENT | PERFORMANCE MANAGEMENT | ASSET MANAGEMENT | FINANCE | PROCUREMENT | HR | OFFICE MANAGEMENT | MA

MONTHLY REPORTING | OFFICE EQUIPMENT | FIXED WATER ASSETS

PROGRESS REPORT FOR THALENI WATER WATER SYSTEM

Report Details

Support Service Agent: WSSA Scheme Name: Thaleni Water

Period Start Date: 26/10/2003 Period End Date: 25/11/2003

Date of Report: 03/12/2003

System Supervisor

Name: BB Zungu Cell No.: 083 635 8159 Tel No.: 032 454

Community Representative

Name: Cell No.: Tel No.:

Scheme Location

KZ Name	Councillor	Tribal Authori
KZ286 Nkandla	3 SIBONGILE MANYONI	

System Description: Water is chlorinated and gravitated from a spring to 8 reservoir.

Source Description: Spring

Network Description

72.50 km of bulk pipeline, and 0 km of internal re

0 standpipe connections and 800.00 household conn

Operational Report

Volume of Water Abstracted: ** kl % Production Losses: 0.00

Volume of Water Treated: ** kl

Scheme Costs for Period

Scheme Operations (Staff, Lab Tests, and Other): Cost: R

Electricity kW Used: ** Cost: ** R

Electricity Average Tariff/kW: Cost: R 0.0

Other Power Sources: Cost: R

Chemicals Used

	Chemical Name	Amount Used	Cost
	HTH tablets		R

Add further rows by clicking the Add button. Add

Sub Total Contractors Cost: R 0.0

Scheme Staff

	Name	Designation	Identity Number	Total Hours	Overtime Hours	T
	B Nduli	Watchman	4609255349080			F
	D Ngubane	Supervisor	7911155487086			F
	M Magubane	Watchman	6010275759080			F
	S Sibiya	Operator	5306275320089			F
	T Manqele	Operator	5802026103089			F

Add further rows by clicking the Add button. Add

Sub Total Staff Costs: R 0.0

Grand Total: R 0.0

Description of Activities:

Water Quality for Period

Free Chlorine: mg/l

Total Chlorine: mg/l

http://www.dims.org.za/Dims/Asset/ReportWater.aspx?ProjCode=UDM00119&Sche... 03/12/2003

K2

	Raw	Final
Turbidity:	NTU	
pH:		

Did the external report pass? Yes No

If test failed, please provide comments:

If test failed, please comment on action taken:

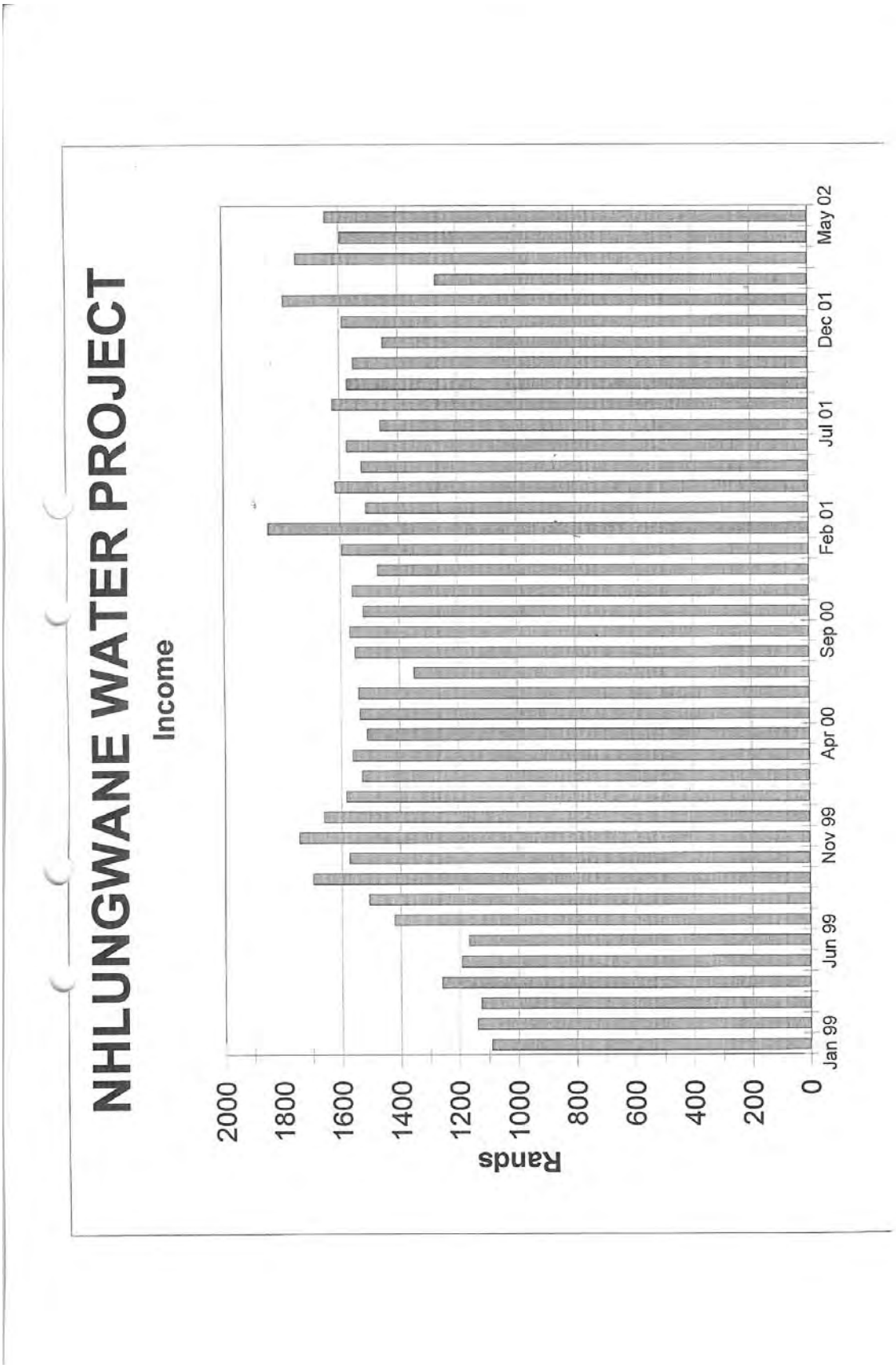
Back Submit

** - an estimate amount is indicated by adding a '*' after the amount (eg 250.00*).

Developed and Supported by

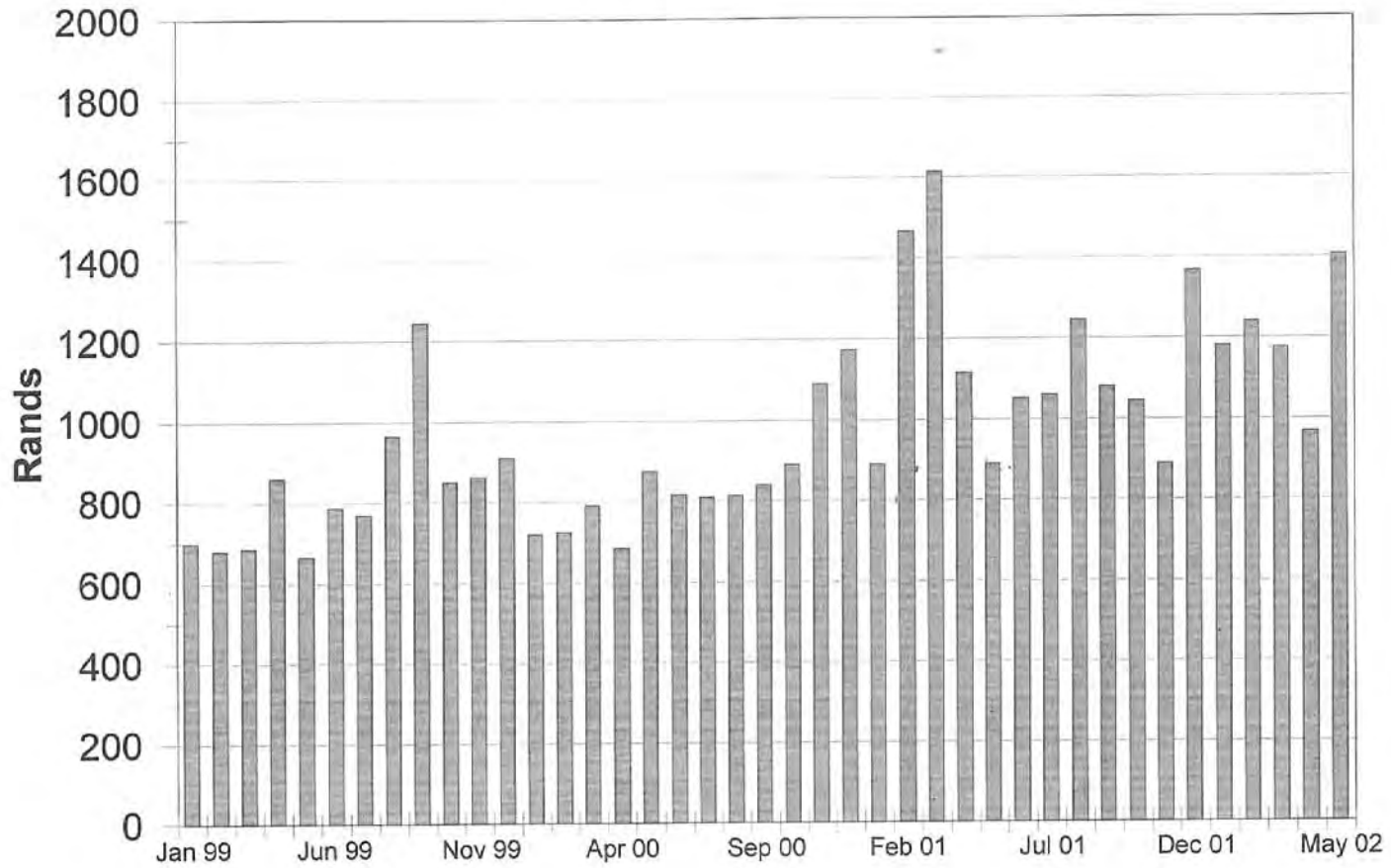
APPENDIX L

A sample of KPI records collected at Nhlungwane, Esidumbini, Montebello and Emayelisweni

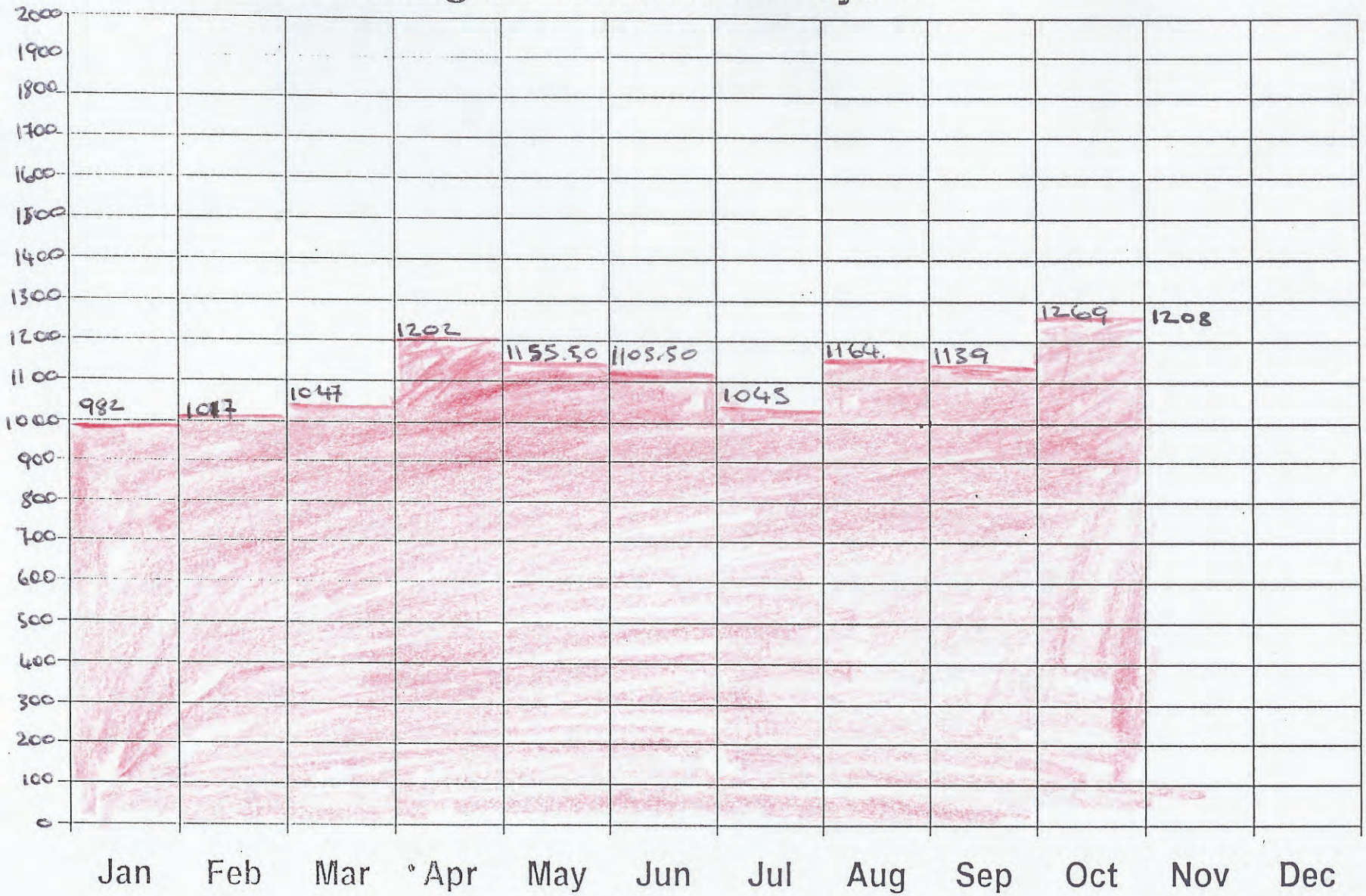


NHLUNGWANE WATER PROJECT

Expenditure

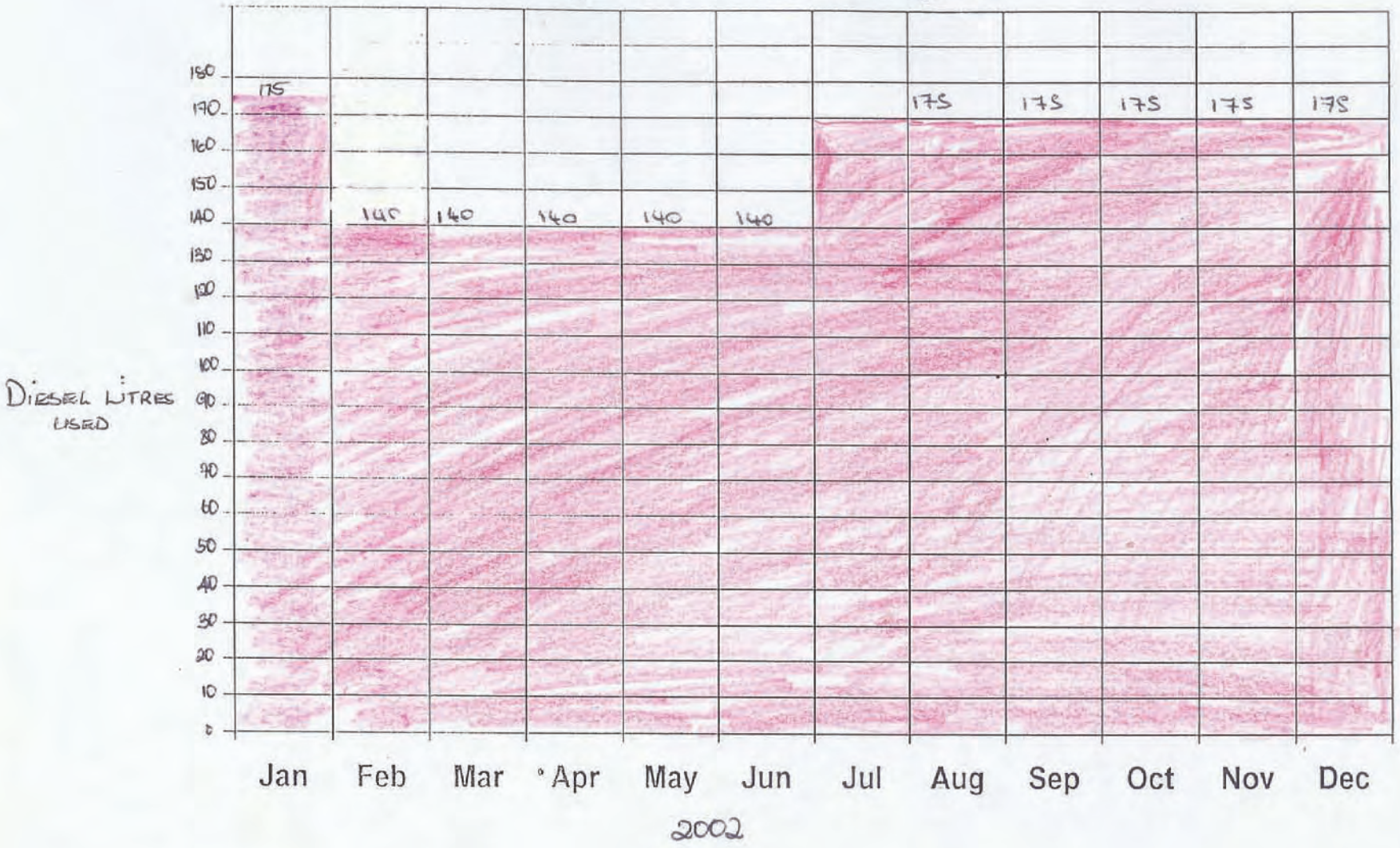


Nhlungwane Water Project



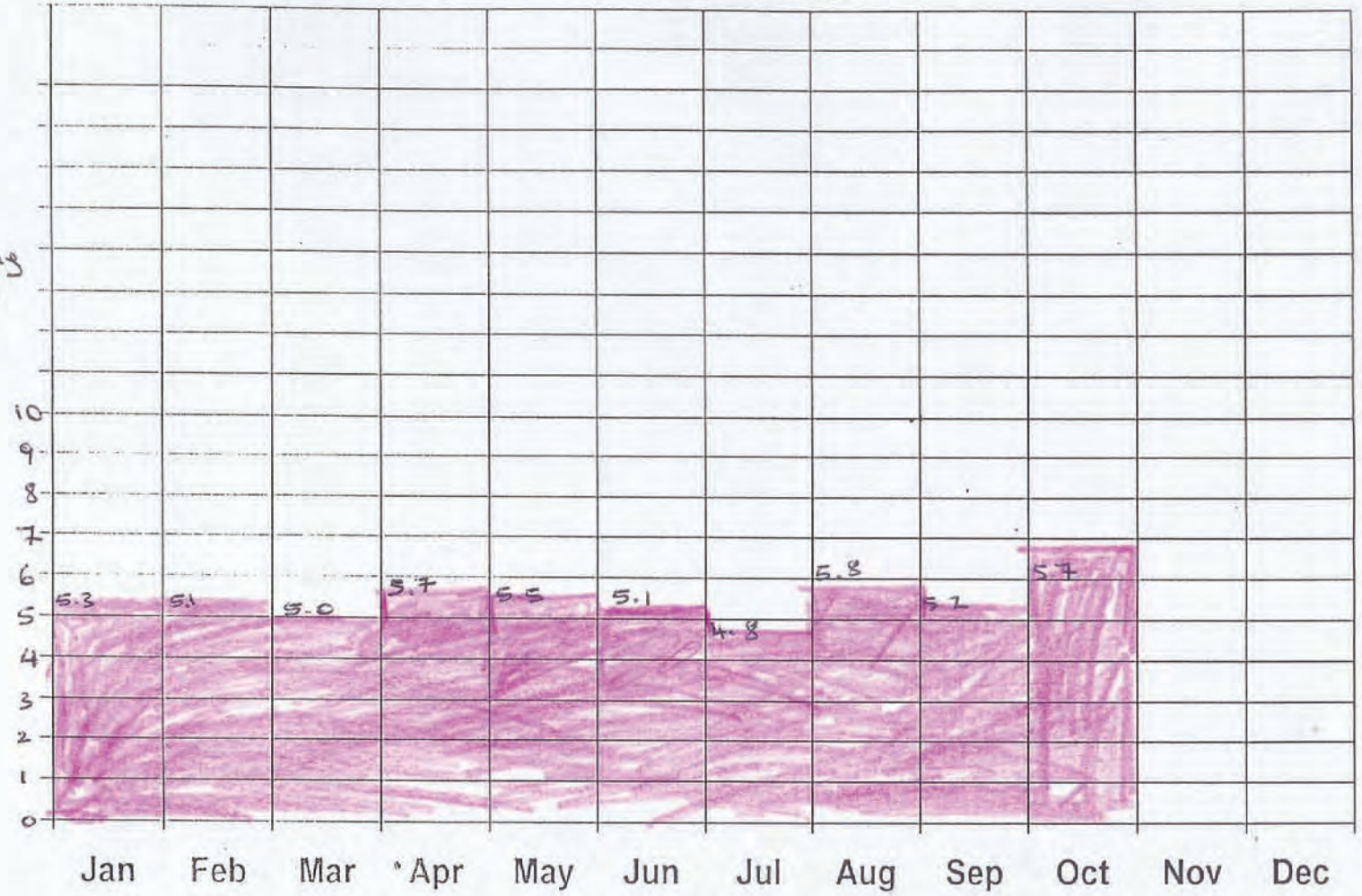
Nhlungwane Water Project

Nhlungwane Water Project



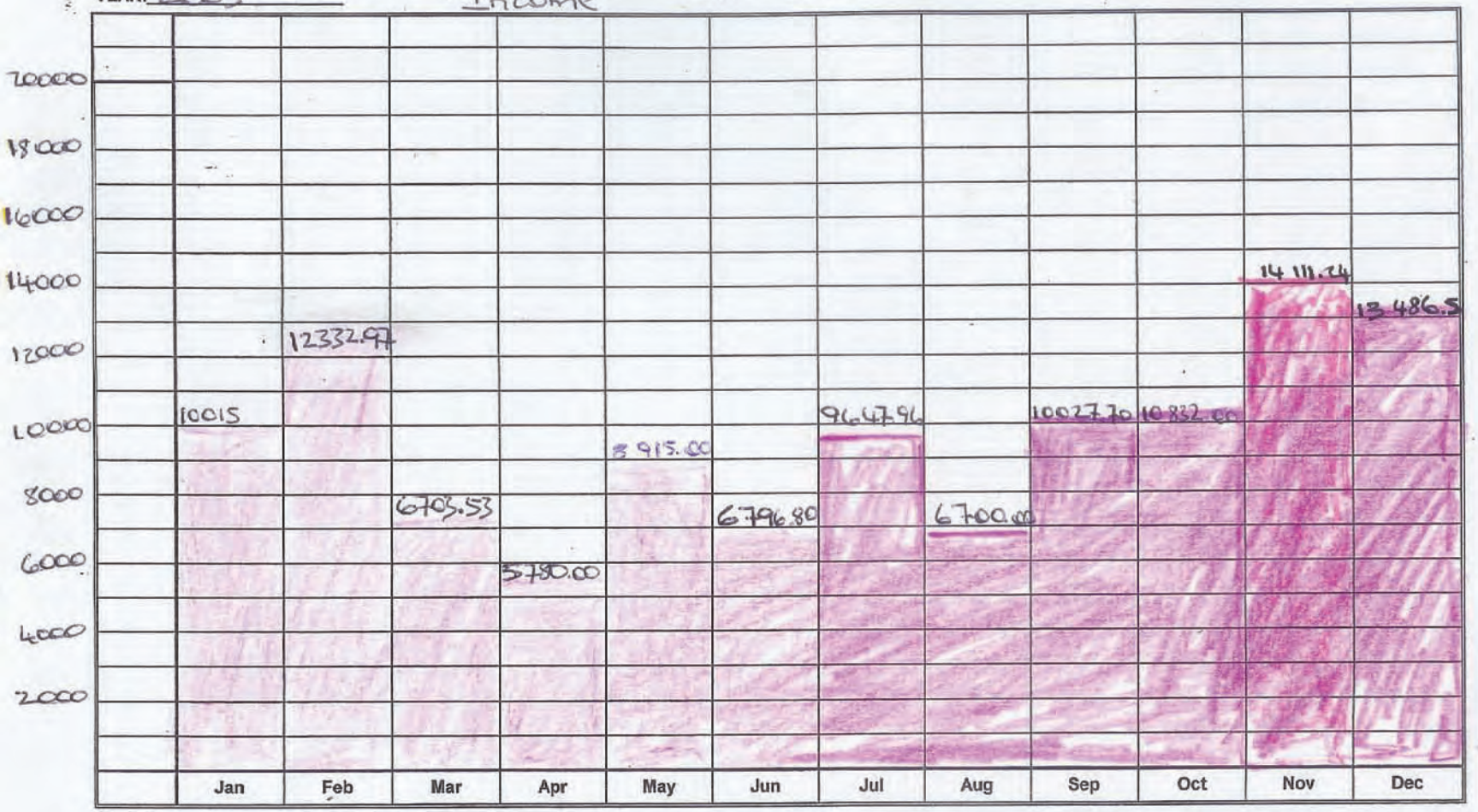
Nhlungwane Water Project

Cost of running the Scheme - 2003



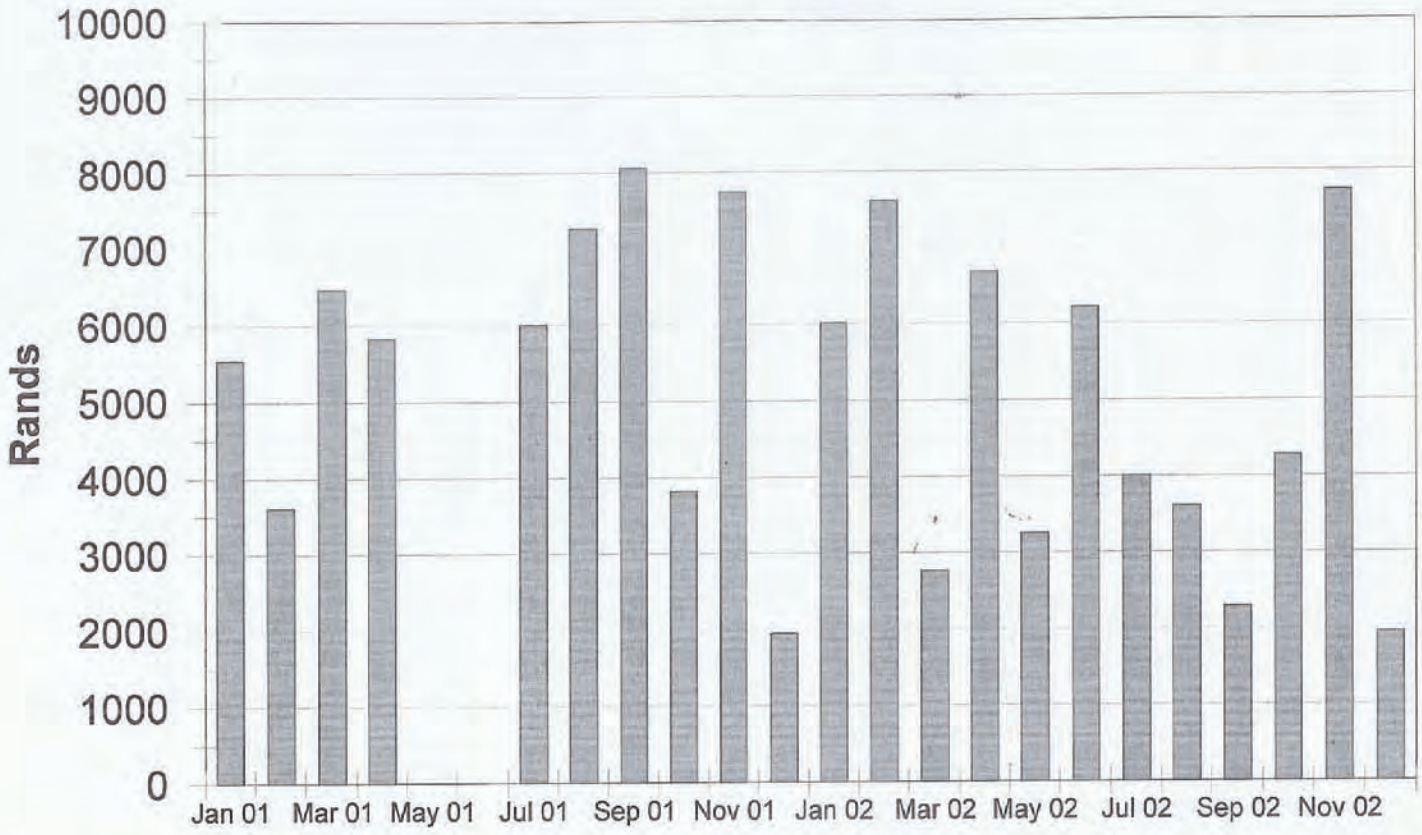
ESIDUMBINI WATER PROJECT

YEAR: 2003 Income Water Sales.



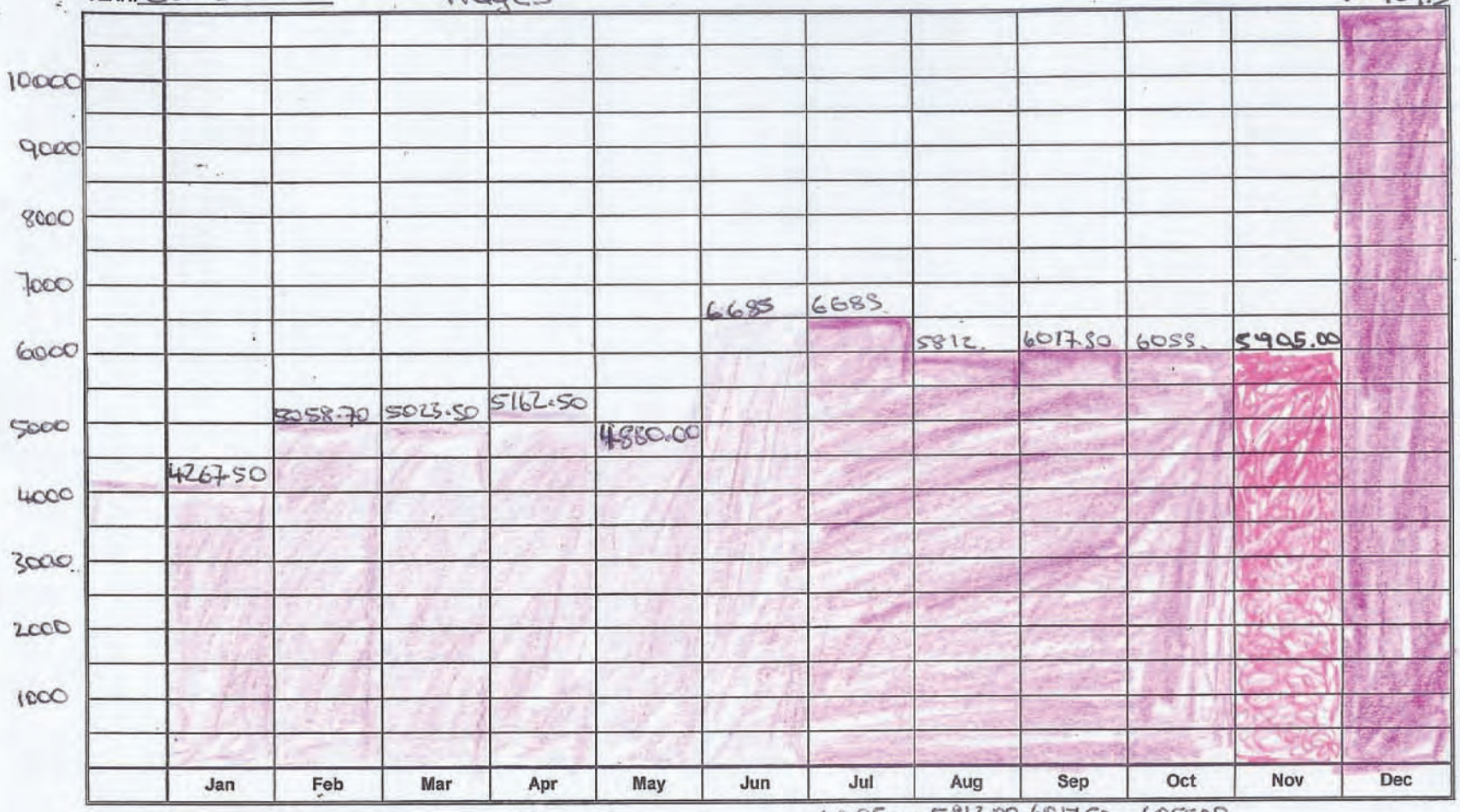
ESIDUMBINI WATER PROJECT

Eskom Charges

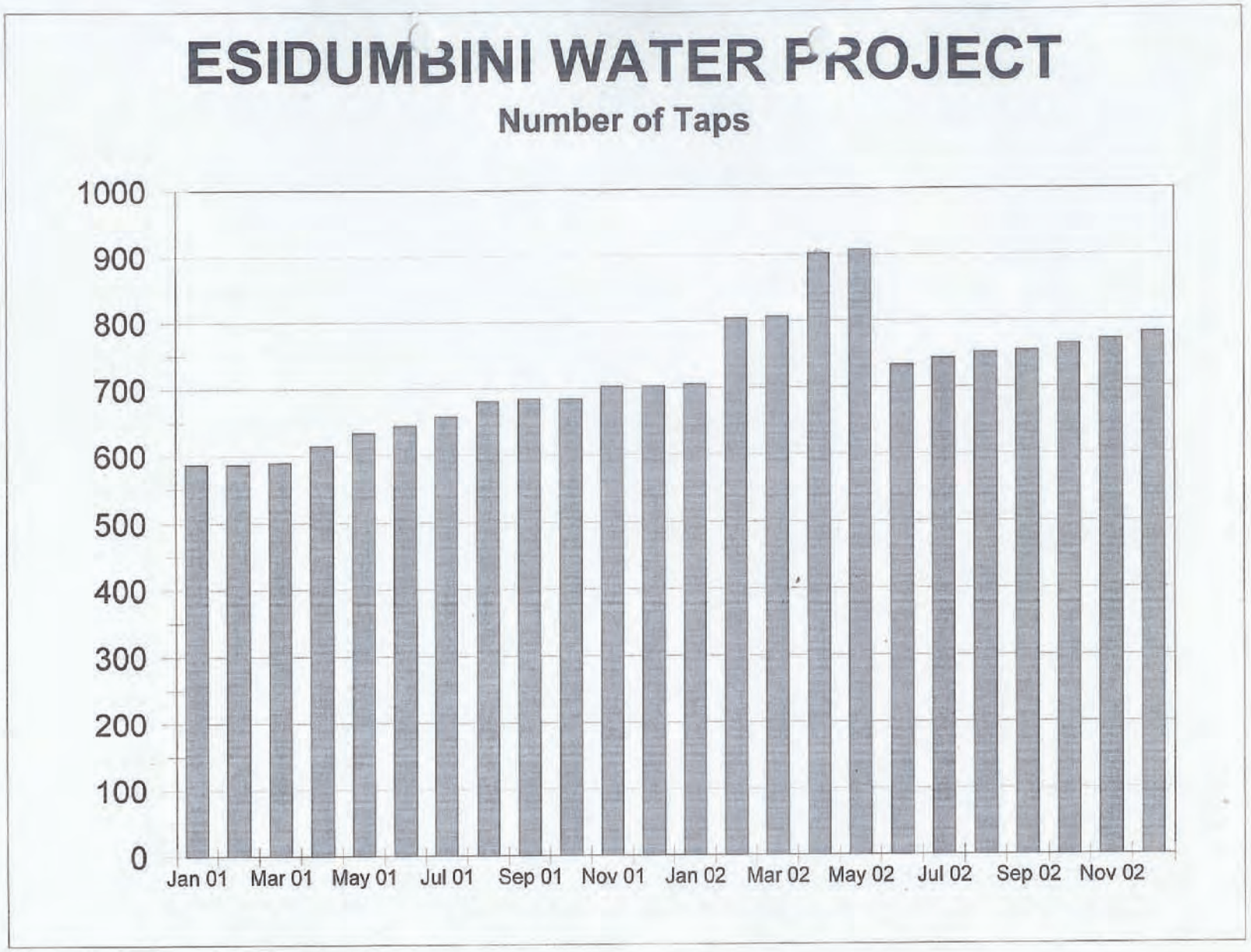


ESIDUMBINI WATER PROJECT

YEAR: 2003 Wages 12704.5



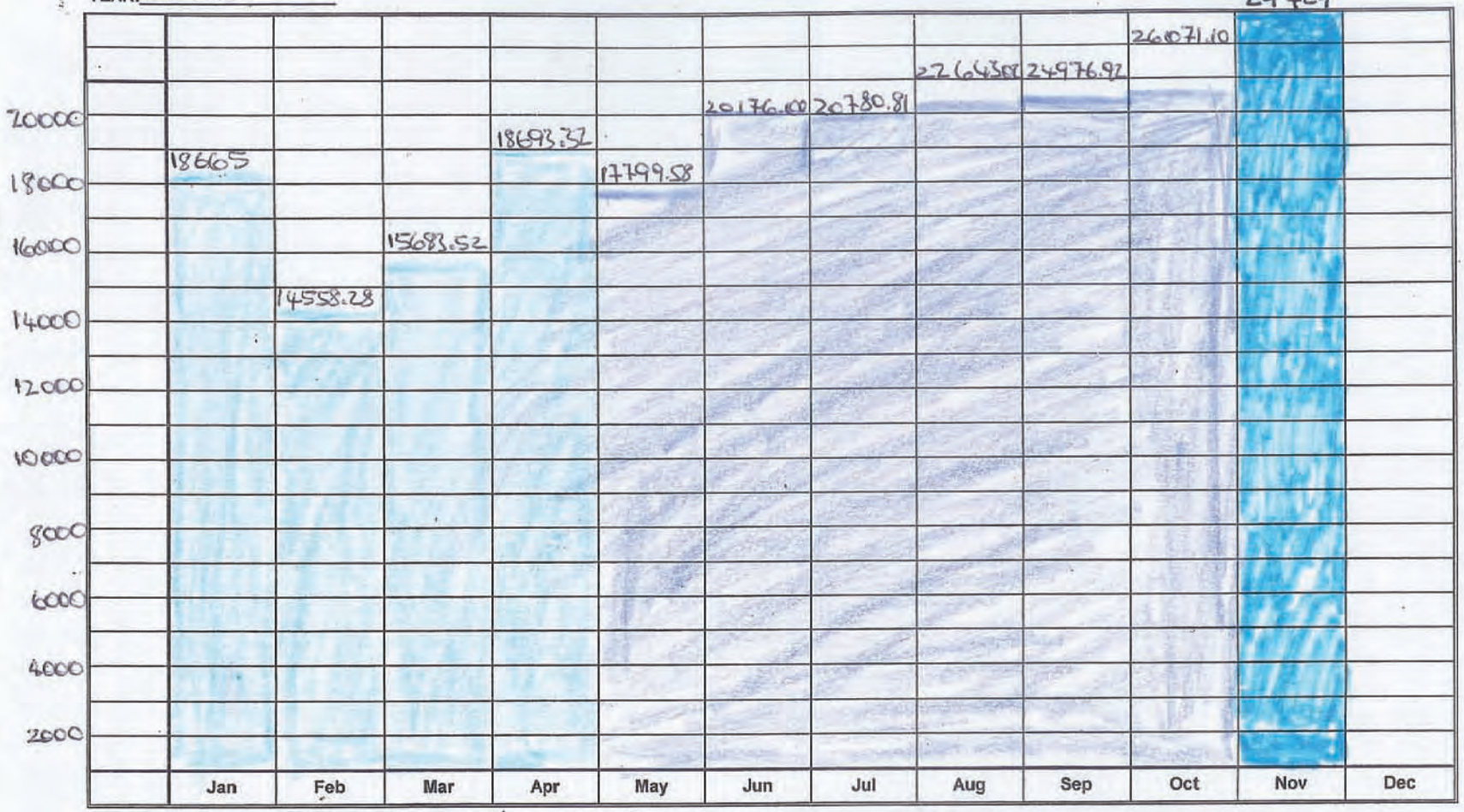
6685.00 5812.00 6017.50 6055.00


ESIDUMBINI WATER PROJECT
Number of Taps
1000
900
800
700
600
500
400
300
200
100
0
Jan 01
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 02
Mar 02
May 02
Jul 02
Sep 02
Nov 02

ESIDUMBINI WATER PROJECT

Bank Balances (Call Account) 001.

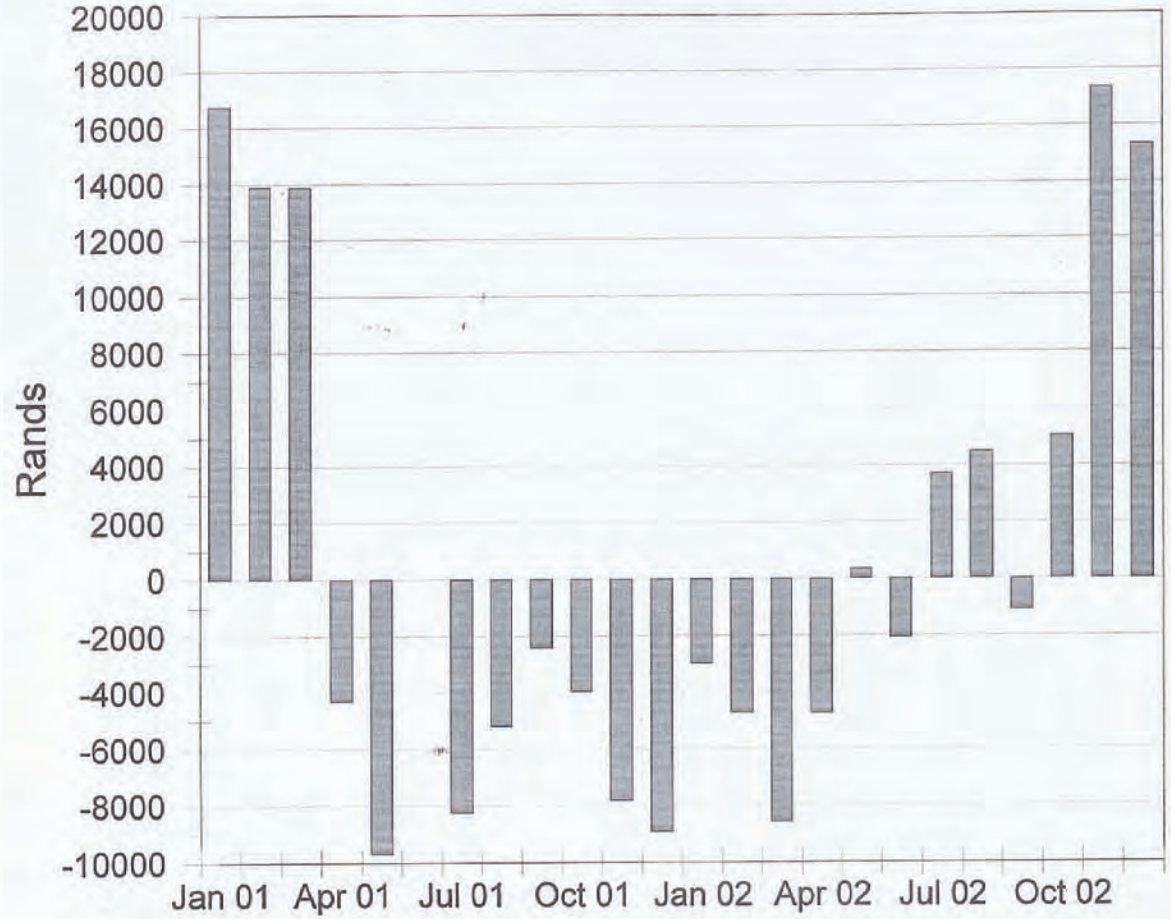
YEAR: 2003



Bank Statement at the end of the Month 001 acc-
(Acc-No 2586712003-001)

ESIDUMBINI WATER PROJECT

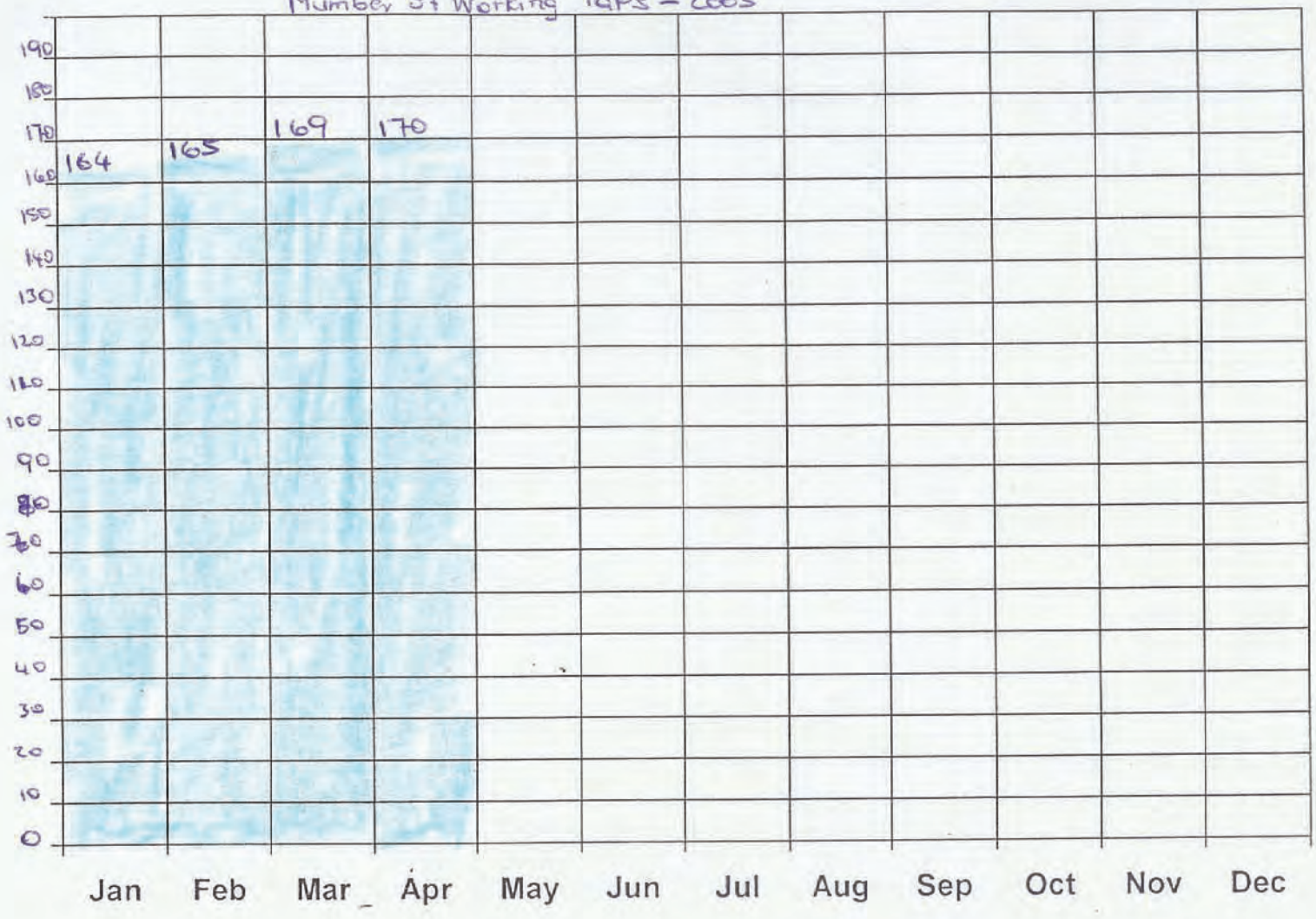
Current Account Balances



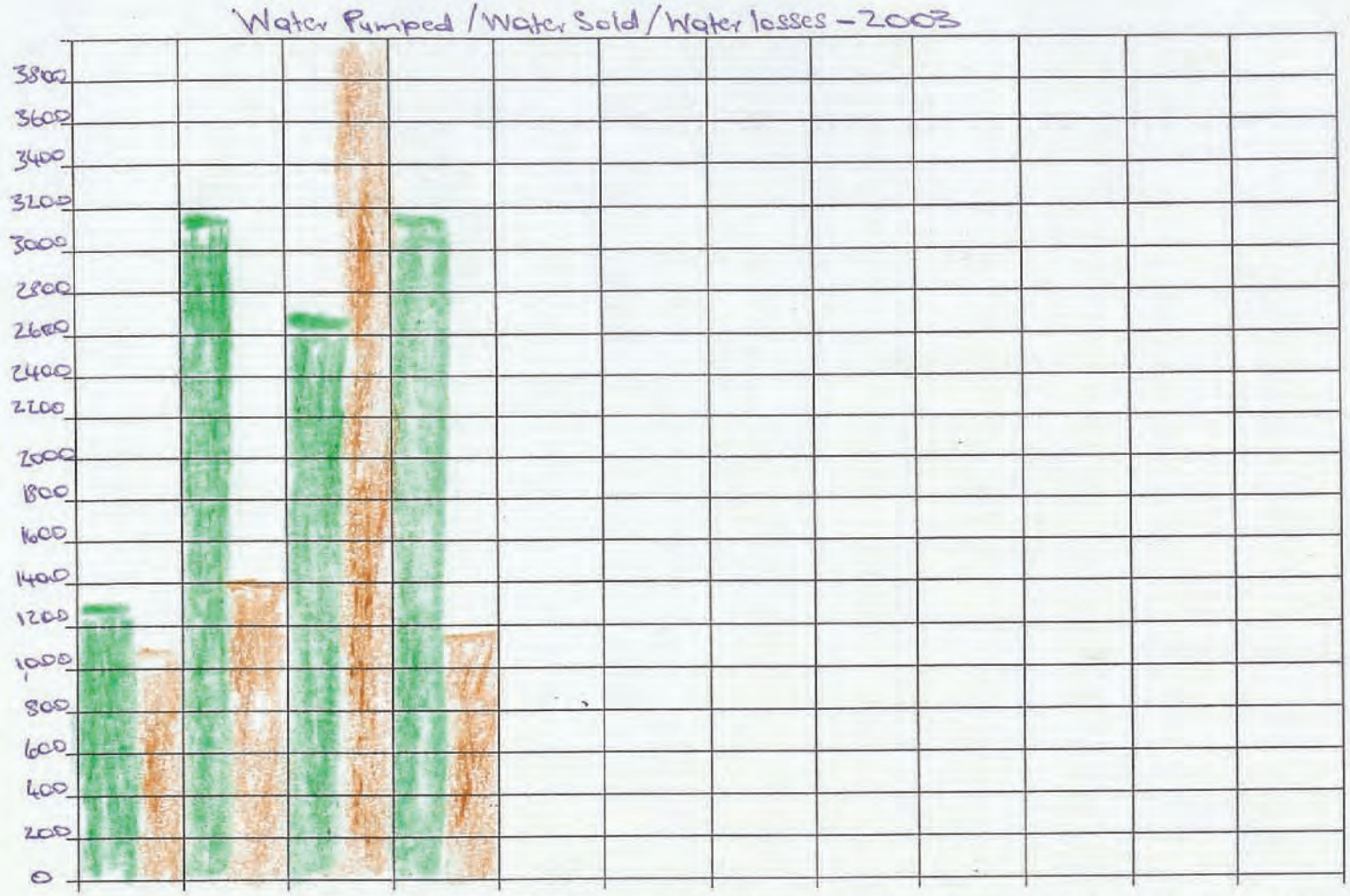
Montebello

Zimiseleni Water Project

Number of Working Taps – 2003



Zimiseleni Water Project

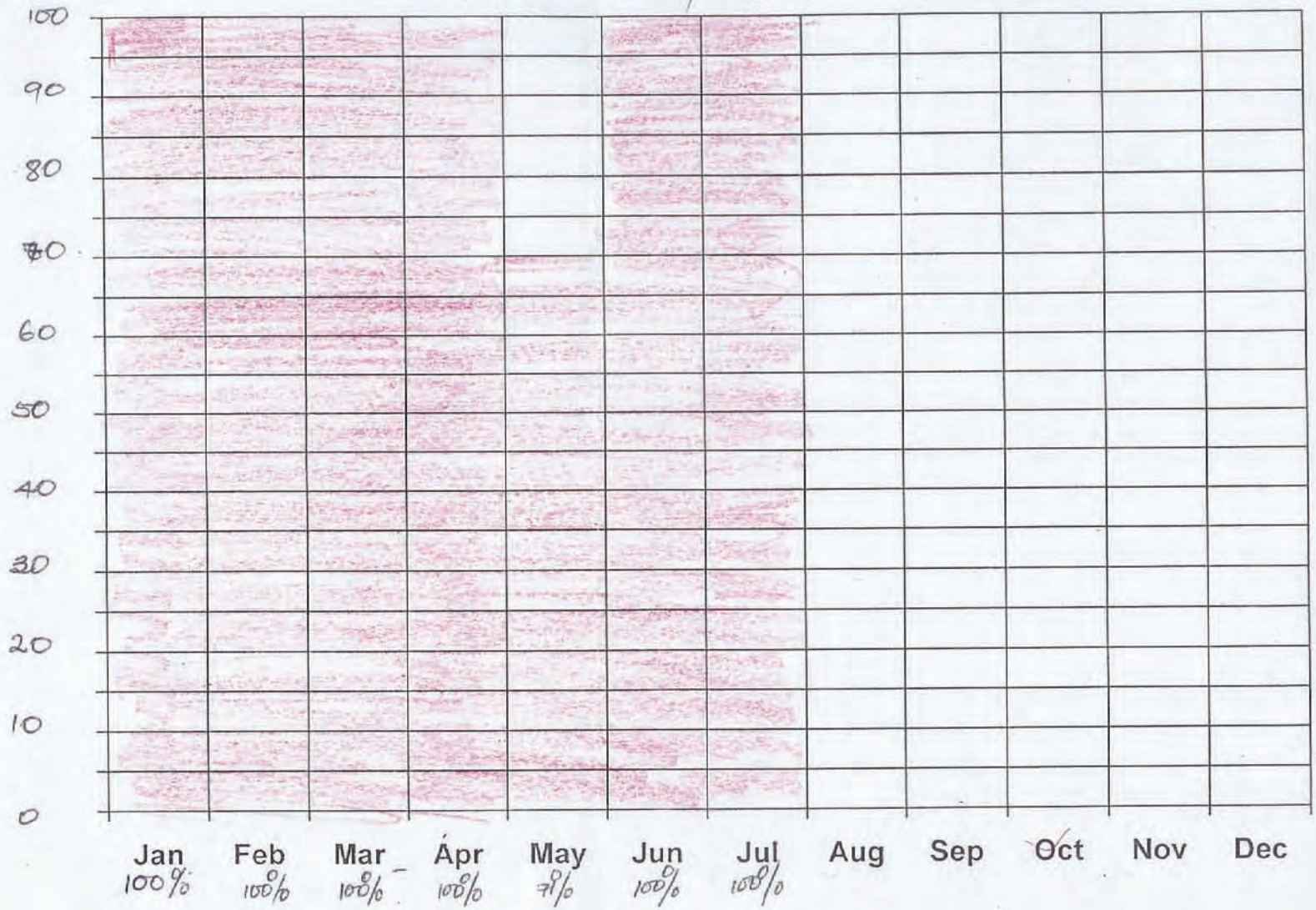


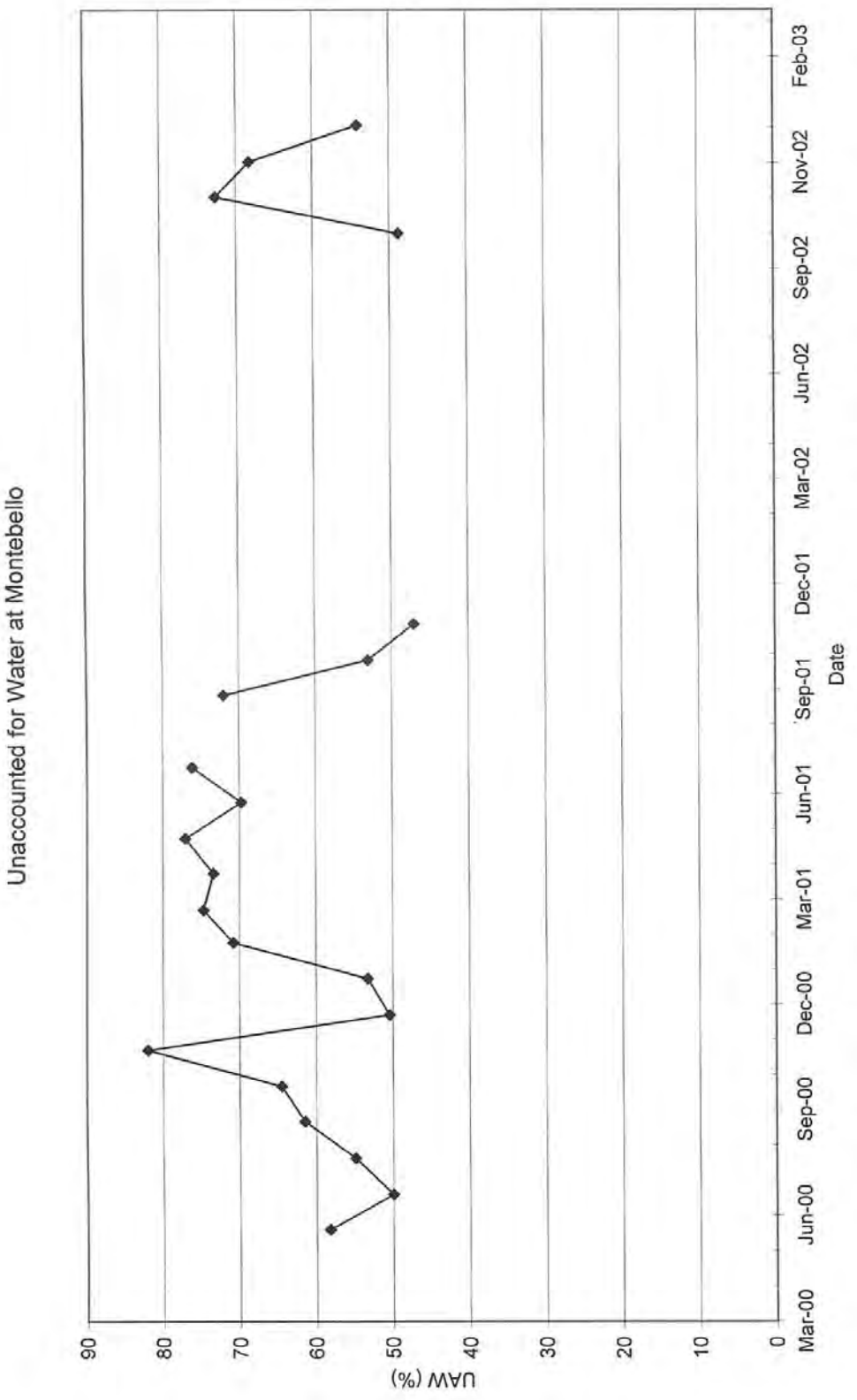
2001

Zimiseleni Water Project

Water Quality (%)

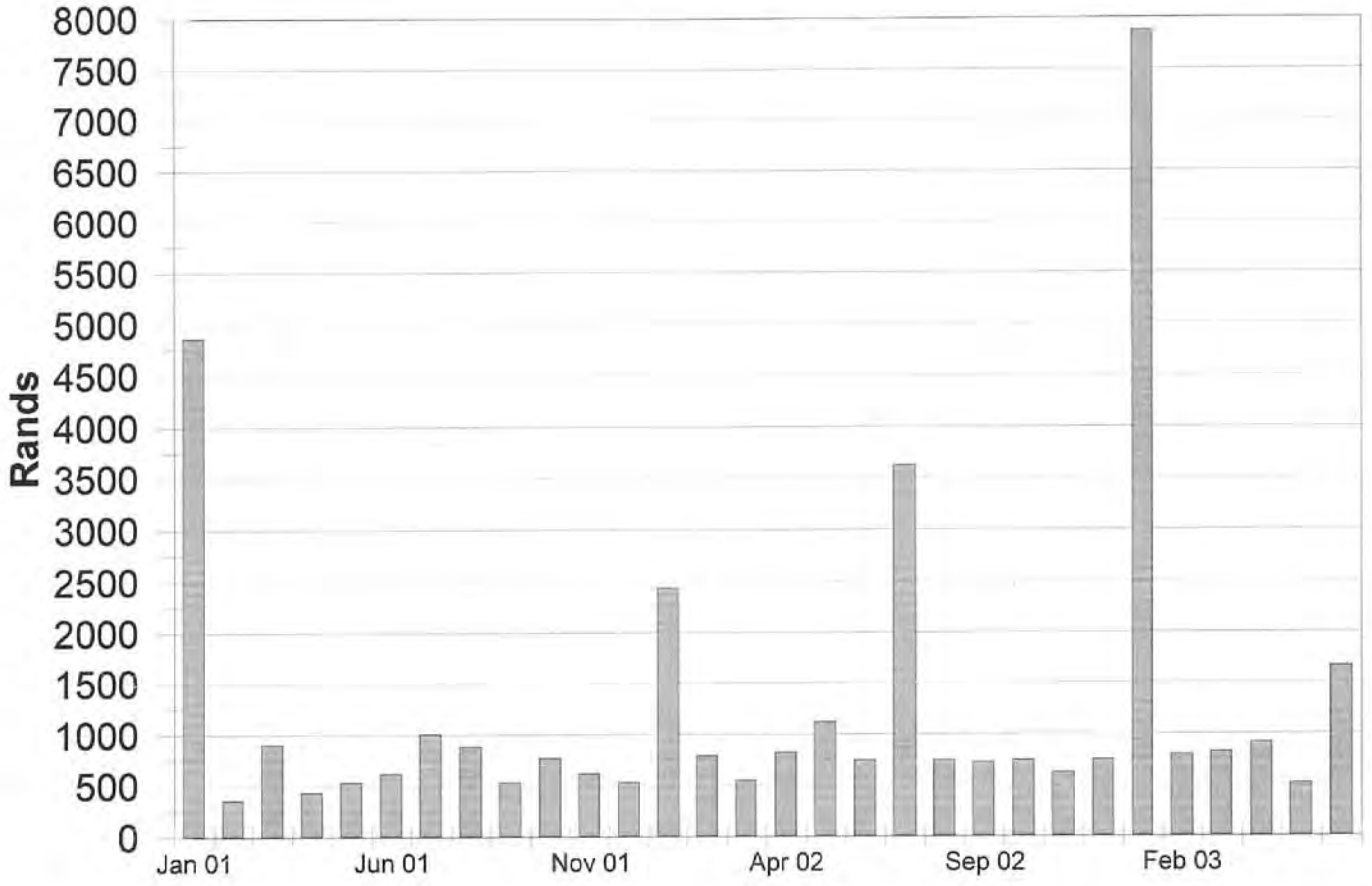
Of the days that water was received, what percentage was good quality?




Unaccounted for Water at Montebello
UAW (%)
90
80
70
60
50
40
30
20
10
0
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Sep-01
Dec-01
Mar-02
Jun-02
Sep-02
Nov-02
Feb-03
Date

EMAYELISWENI WATER PROJECT

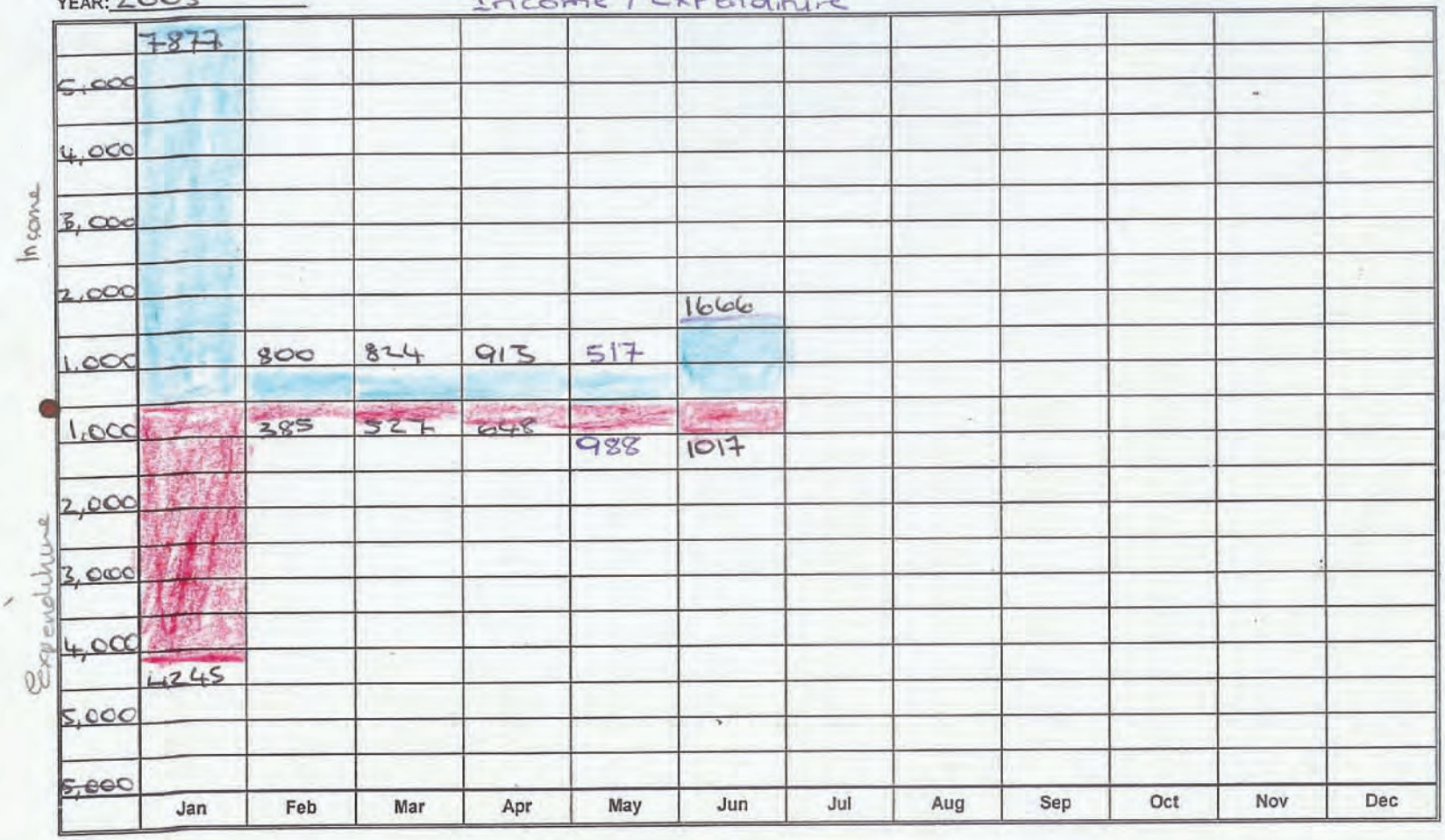
Income



EMAYELISWENI WATER PROJECT

YEAR: 2003

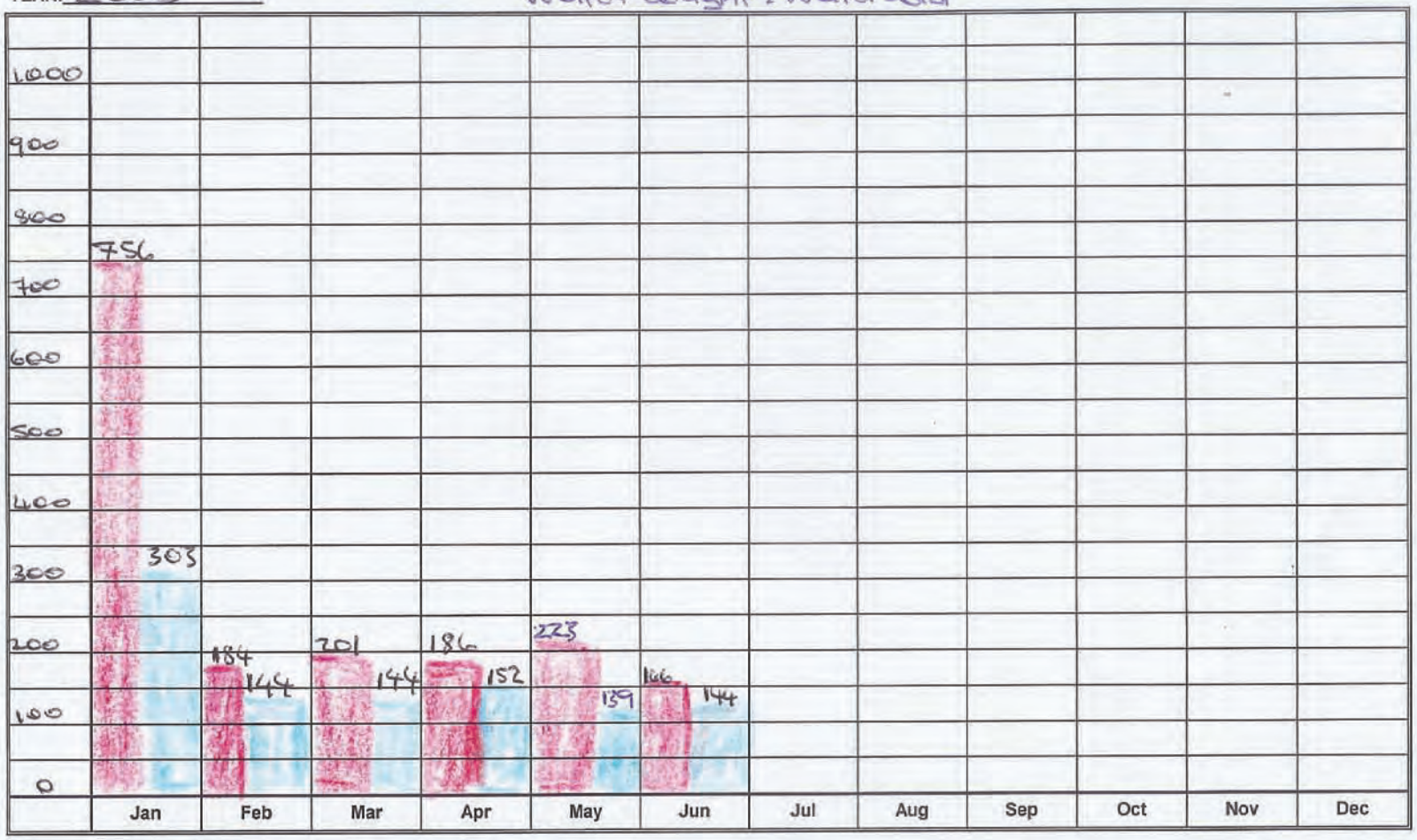
Income / Expenditure



EMAYELISWENI WATER PROJECT

YEAR: 2003

Water Bought / Water Sold



water bought
water sold

IS EVERYBODY GETTING WATER?

KEY: –

write ... number of taps which are receiving water
write here the total number of taps in the scheme

TOTAL SCORE FOR MONTH

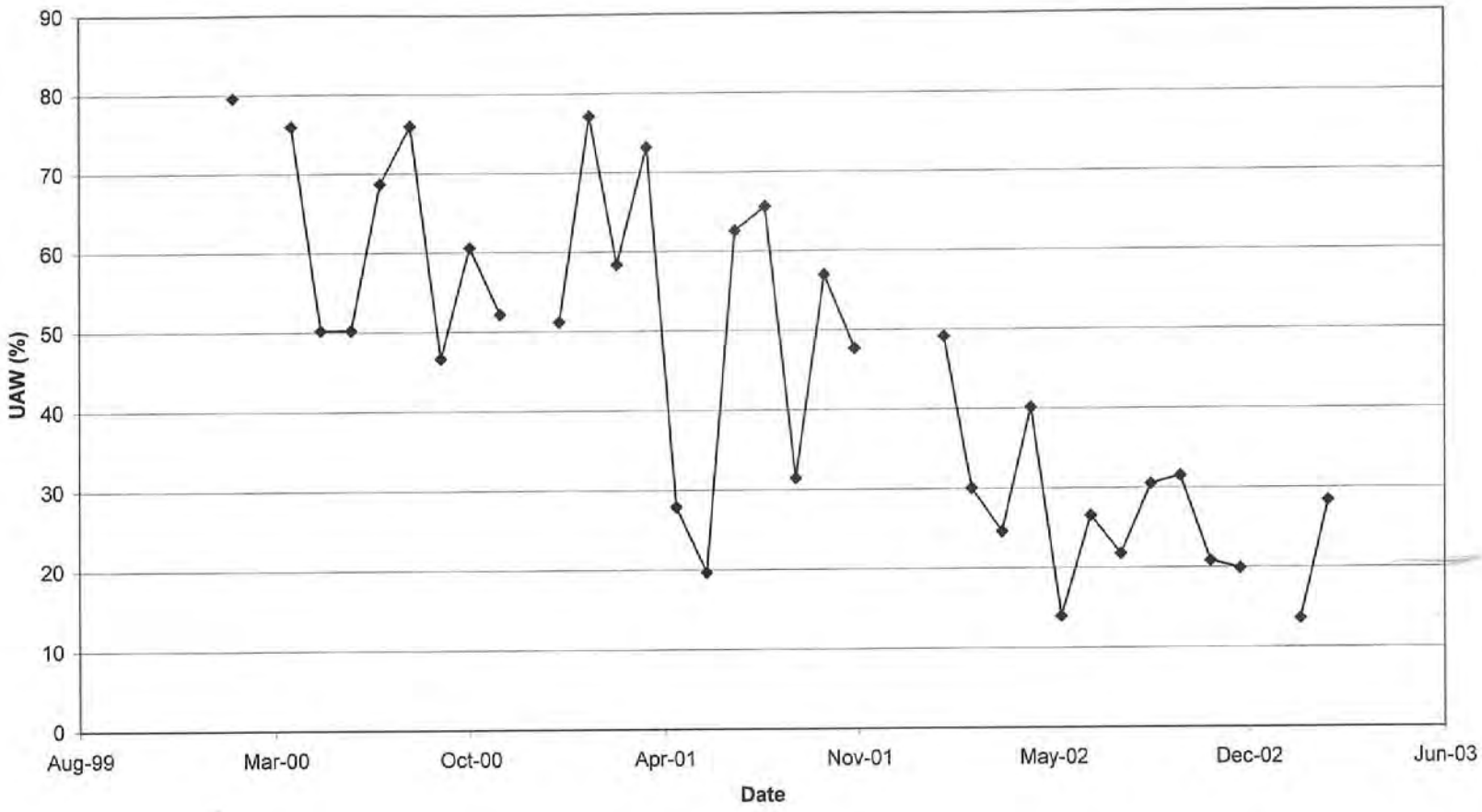
write here the total of all the top blocks
write here the total of all the bottom blocks

MONTH: JULY 2002

WEEK	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
One							
	46	46	46	46	46	46	46
Two	45	45	45	45	45	45	45
	46	46	46	46	46	46	46
Three	45	45	45	45	45	45	45
	46	46	46	46	46	46	46
Four	45	45	45	45	45	45	45
	46	46	46	46	46	46	46
Five	45	45	45			TOTAL ACTUAL	1392
	46	46	46			TOTAL POSSIB	1426

= 97%

L20


Unaccounted for Water at Emayalisweni
UAW (%)
90
80
70
60
50
40
30
20
10
0
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
Dec-02
Jun-03
Date