

D Still • P Mwangi • P Houston

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Water Research Commission



COST AND TARIFF MODEL FOR RURAL WATER SUPPLY SCHEMES

Final Report to the Water Research Commission on the Project Development of a Framework for the Calculation of a Monthly Tariff Payable in Stand-Alone Community Water Supply Schemes

by

D Still, P Mwangi and P Houston

The Mvula Trust University of Durban Westville Partners in Development

The model, which is written in Excell 97, can be downloaded from the Water Research Commission website www.wrc.org.za

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Executive Summary

In 1981 the United Nations launched the International Drinking Water Supply and Sanitation Decade. The aim of the Decade was to bring about safe water and sanitation for all the people of the world. During the Decade, some 1600 million people were served with safe water. However by the end of the Decade it was estimated that there were still over one billion people without safe water (WHO, 1997). The continent with the highest percentage of unserved people was Africa, with 43%.

Now, twenty years after the decade began, it is estimated that, worldwide, 1.1 billion people are still without access to potable water (WHO, 2000). Some 38% of Africa's population are without access to safe water, but due to population growth the size of the backlog has actually increased. In addition a number of areas which are classified as served are known to receive water only intermittently.

The coverage figures quoted above do not tell the full story, for it is in rural areas that the percentage of unserved people is highest, and that the progress made is the lowest. In 1990 it was estimated that 56% of Africa's rural population were unserved. By 2000, despite major efforts, the figure had reduced by only 3% to 53% (WHO, 2000).

Over the last five years, a consensus has emerged on the principles to guide the provision of rural water supply. Internationally, policies call for treating water as an economic and social good managed at the lowest appropriate level. For the provision of water supply this requires that consumers be engaged in the process of selecting, financing and operating systems that meet their demands and willingness to pay.

Managing water as an economic good has strong implications for the establishment of proper financial arrangements for a project. Financial policies should send out correct signals linking service levels to actual cost, maximise cost recovery by capturing community willingness to pay, and make efficient and equitable use of subsidies.

In common with other parts of the developing world, the rural water sector in South Africa has been heavily subsidised for some time. Prior to the transition to universal franchise in 1994, government programmes in rural areas tended to focus on handpumps and windmills. These more simple water supply solutions (which due to institutional problems did not necessarily work) were thus associated with the "old" South Africa and regarded as third-class. Since 1994 the almost universal drive in the sector has been to get a piped water supply to within reach (classified as 200 metres) of every home. This is the standard practically every community aspires to, and delivery on this standard carries a very high political premium. However, it is being found that, again due to institutional problems, these reticulated schemes are, if anything, even more prone to failure than the old handpumps and windmills. The government's response to the problem of the poor sustainability of rural water supply has been to give an undertaking, on behalf of local government, that every family is entitled to 6 kl of water per month free of charge. In rural areas this

undertaking is to be financed by local government primarily by using a portion of a grant (the Equitable Share) which has been made available to them for the purpose of making basic services affordable to the poor. It is expected that the more rural councils in South Africa may require at least three years to implement the free water policy, and it is realised that in some areas it may not be possible to meet the promise at the level of service implied by the policy (Department of Water Affairs and Forestry, 2001).

In this context, with international practice pushing towards increasing independence of government, down to the lowest level possible, and South African practice pushing towards increasing dependence on government, it is particularly relevant to ask the question: how much does rural water supply cost, anyway? How much does it cost national government, how much does it cost local government, and how much does it cost the body actually responsible for making the water supply work. The cost is highly dependent on many variables, such as the capital cost, the need to pump, or not, the need for ongoing support, or not, and the effectiveness of management. For example, all other things being equal, one scheme which has high transmission losses, low consumption levels and high levels of bad debt, could find that its water cost is ten or twenty times that of a scheme which has all those conditions optimised.

This report reviews a selection of the literature, local and international, discusses a number of water tariffing models which are used in the sector, and goes on to examine the legal and political framework in which water supply operates in South Africa. Thereafter a new model is described, a model which has been developed particularly for the evaluation of costs and tariffs for rural water supply schemes. The model is fairly simple to understand and use, and yet it can accommodate virtually any combination of subsidies, service levels and tariffing options. It can be used either at the planning stage to investigate the economic viability of a scheme, or as a tool during the operational phase to test different tariff scenarios.

Research Objectives

The objectives of this research were set out in the original proposal as follows:

- To determine the minimum factors which constitute the monthly running costs of standalone community supply schemes to ensure that the schemes are operated and maintained in a sustainable manner utilising local resources.
- To obtain empirical data for the monthly running costs from existing water supply schemes, hence
- To develop a financial framework, which provides guidelines to consultants, planners and local authorities on the basic monthly running costs of such schemes.

Findings from field research

Over forty operational stand alone type rural water projects were visited and surveyed in order to obtain a picture of the kinds of operation and maintenance costs which are being experienced in the field. The data from these projects is summarised in tables and an appendix to this report.

The key observations from this field work were as follows:

i) Water Consumption

Although water consumption can in most cases only be estimated from the data gathered, the indications are that the median water consumption in rural areas is low, less than 4 kl per month. Schemes with metered yard taps recorded relatively low consumptions, but those with unmetered yard taps recorded higher consumptions. For example, the average consumption at Emayelisweni/Montebello was just 3.12 kl/hh/month, or 8.7 litres per person per day (but this is based on the assumption that each yard tap is shared by 12 people - which may be an overestimate). The only schemes which have consumption figures above 25 litres per person per day, or 6 kl/family/month, are the Fairview and Nomponjwana schemes in KwaZulu-Natal, both of which have unmetered yard connections. The estimated consumption figures for these two schemes are 16.07 and 8.14 kl/hh/month respectively.

ii) Cost per family per month

The budgeted costs per family per month are low. The mean figures in 1999 rands were R9.15, R5.49 and R3.87 for KwaZulu-Natal, the Northern Province and the Eastern Cape respectively. However the spread of figures is wide - the standard deviations of the mean in the provinces are R8.62, R6.81 and R2.80 respectively [The standard deviation gives an indication of the spread of the bulk of the data above and below the mean]. In other words the majority of projects are running on budgets of less than R15 per family per month, and some much less.

Caution needs to be exercised in drawing any conclusions from the data, as some projects were not able to declare the details of the operational subsidies which they are receiving. For example, in the Northern Province it is common for DWAF to pay the cost of pump servicing, fuel and operators wages. However, although it is common, it is also not standard on all projects, so it is hard to know how to adjust for this hidden subsidy.

iii) Cost per kilolitre

The mean budget cost per kilolitre is R4.96 in KwaZulu-Natal, with a standard deviation R3.58.

In the Northern Province the mean is R1.78, with a standard deviation R1.35. In the Eastern Cape the figure is R1.61, with a standard deviation R0.90. The higher costs in KwaZulu-Natal are

indicative of the greater use of water meters or water vendors in that province.

iv) Water tariffs

Water tariffing practice varies from scheme to scheme. The flat-rate monthly payment system is the most popular cost-recovery option, employed by 31 of the 38 projects surveyed. Of the seven with water metering, six were in KwaZulu-Natal, and one was in the Eastern Cape.

The mean flat rate was R9.47/hh/month, with a standard deviation of R5.98. In other words, the typical range of monthly charges on community water projects with flat rate charges is between R4 and R16. In KwaZulu-Natal the mean flat rate charge was R14.63, with a standard deviation of R8.57, whereas in the other provinces it was lower (Northern Province mean R8.19 with std. dev. R2.32, Eastern Cape mean R5.30, std. dev. R2.68).

On the nine projects where water was being charged for at a metered rate, the mean rate was R6.33/kl, with a standard deviation of R2.36/kl.

v) Bad debt levels

The levels of bad debt are in general representative of projects which are operating. The typical levels of payment are 70%, i.e. some 30% of the people served are defaulting.

Some anomalies are evident in the tables. For example there are four schemes (KwaNyuswa, Mission and Mvunyane in KZN and Claremont in the Northern Province) which have reported receipts over the six month survey period in excess of budgeted income. There are two possible explanations: either the period included receipts from people who were paying off several months at once; or the receipts recorded do not distinguish between payments for water and connection fees. The latter is the more probable explanation.

vi) Absence of savings

The most notable thing about saving for asset replacement, is that it is not happening. This is to be expected in poor rural communities, where life is sustained on a hand to mouth basis. The expenditure figures obtained thus do not adequately reflect the long term operation and maintenance costs, and as such do not represent the real costs of operating these schemes.

However, there is concern that when a major repair cost does present, e.g. if the diesel engine needs to be reconditioned, or the electric motor is damaged by lightning, then there are no savings available to meet the cost.

vii) Schemes operating in deficit

Several of the schemes were operating in the red (the more notable examples being Dicks, Emayelisweni, Ngolokodo and Ezinqeni in KZN; and Claremont, Seokodibeng, Mankotsana and Mars in the Northern Province). These projects are still operating either because they are not paying their accounts or their staff and getting away with it (e.g. Ezinqeni), or because they receive operational assistance from DWAF.

viii) Cost effectiveness of gravity schemes

The 38 projects surveyed included three gravity schemes where no pumping was required, two in KwaZulu-Natal (Vukanathi and Zamimpilo) and one in the Eastern Cape (Tsita). A distinctive feature of these projects are their very low operating budgets. The budgets for the three projects are: Tsita R1.37/hh/month; Vukanathi R0.63/hh/month; and Zamimpilo R1.09/hh/month. The corresponding tariffs are R3/hh/month, R7 and R10. At Vukanathi it appears that no-one is paying the tariff, but as this is a gravity scheme it is at this stage still functioning.

ix) Cost effectiveness of community management

It is notable that the typical wages paid to staff are very modest. Wages of R200 to R500 per month are typical. Although the work is part-time, there is clearly a spirit of community service at work in these projects. These low staff costs are also a reflection of the cost effectiveness of community level management, compared with management from the nearest urban centre.

Also notable is the very negligible amounts being spent on transport. Most committees are not needing to spend more than R200 per month on transport, although the median expenditure is much less than that. This is again a reflection of the cost-efficiency of community level management.

Development of WRC Cost and Tariff Model for Rural Water Supply

Four existing water supply financial models are reviewed in this report. They are:

- the DWAF/Ninham Shand Water Supply Service Levels model;
- the Mvula Trust's Help Manual on Rural Water Credit;
- iii) the Palmer Development Group's Water Supply Services Model; and
- iv) the Raftelis model.

These models have each been developed for a specific purpose. The Mvula Trust's Help Manual for Rural Water Credit is structured to assess the advisability of using loan finance to upgrade a community water supply. It combines a needs analysis, income and affordability data and a cost model to assess whether a project will generate sufficient income to pay back a loan.

The Palmer model, on the other hand, has been developed primarily for the managers of urban water supply systems. The model enables planners to assess the viability of new infrastructure investments in the light of the needs of their changing and growing cities. This model is widely used in South Africa.

It was concluded that a cost and tariff model tailored specifically for rural water supply in South Africa should have the following features:

- i) It must be possible to run the model either at a simple level, or at a more complex level i.e it must be possible to use the model even if accuracy is compromised, even if only the bare details regarding a scheme are known, or if the user does not have the time to fill in all the information which is known. However, the user that has the detailed information and the time to run the model at a more sophisticated level should be able to do so.
- ii) The model must separate costs into a logical framework, i.e. capital costs, asset replacement costs, overhead costs, production costs, repair and maintenance costs, support and mentorship costs.
- No costs must be hidden. Any subsidies applicable must only be taken into account once all real costs have been determined. (One of the uses of the model is for the comparison of the economics of different options - this can obviously not be done if any costs are hidden).
- iv) All data must be entered only once in the model, to avoid situations where a change in the value of a key variable at one point is not reflected at another point.
- v) It must be possible to model any simultaneous combination of Levels of Service. While a scheme may primarily supply water via community standpipes, for example, it may also include a large number of yard connections.
- vi) Where possible the model layout, structure and terminology should reflect the Department of Water Affairs and Forestry's Operation and Maintenance reporting system for rural water schemes. During the last two years a fairly comprehensive O&M reporting system has been developed by DWAF and Umgeni Water specifically for rural water schemes. This reporting system uses certain terminology and cost codes, all of which have been reflected in the relevant pages of this model.
- vii) The model must be able to process simultaneously various water demand scenarios. Cost per kilolitre is generally very sensitive to demand, mainly because the fixed costs (capital costs, asset replacement, rental charges and salaries) tend to be the dominant factor in the pricing of water, particularly rural water.

- viii) The levels of water loss and bad debt must be explicit. Water losses and bad debt can jointly affect the cost of water by an order of magnitude. It is thus critical that these aspects of pricing are clearly dealt with at the relevant points in the model.
- ix) The model must distinguish between total population and population served. It is misleading to base tariff calculations on the total population in a project area if not all these people are served by the project.
- Loan and grant finance must be separately specified.
- xi) The model must reflect the effect of inflation on asset replacement costs.
- xii) The model must allow for cost sharing between Water Services Authorities, Water Services Providers, National Government and other stakeholders.
- xiii) In setting tariffs, users must be able to use a combination of fixed charges and volumetric charges (with rising blocks, if required) for any level of service. The user must be able to specify different tariffs and charges for each different level of service.
- xiv) The model must reflect costs in terms of both volume of water supplied (R/kl) and in terms of households served (R/hh). The volume of water supplied here must exclude losses. The cost per kilolitre is important indicator of the effectiveness of a water supply scheme. The monthly cost per household served is an important indicator of affordability.

A model meeting the above criteria has been developed, and is described in Chapter 6 of this report. Provisionally this model is called the WRC Rural Water Supply Cost and Tariff Model.

Five case studies are presented in Chapter 7 - a pumped water scheme, a handpump programme, a shallow well programme, a gravity water scheme and a rainwater harvesting programme. The model shows how widely real costs vary, both within a case study according the level of consumption, and between studies. The major factors influencing external costs are the costs of asset replacement, and support and mentorship.

The model can be used to test how the Free Basic Water Policy can be implemented. It is concluded that the policy means that local government must carry practically all costs on rural water schemes (which means they will in some cases require additional assistance from national funds). The policy might therefore cause local government to rethink the suitability of more modest technologies such as handpumps and rainwater harvesting.

Recommendations

It is recommended that the WRC Rural Water Supply Cost and Tariff Model be demonstrated and freely distributed to practitioners in the field. If the model is found to be appropriate and useful, then it is further recommended that it is used as a standard for the calculation of costs and tariffs for rural water supply projects in South Africa, and is included with project planning reports for this purpose.

It is further recommended that the Department of Water Affairs and Forestry require all Water Services Authorities to keep up to date records of all operation and maintenance data on all rural water schemes under their jurisdiction, and that for this purpose a standard format is used to enable easy comparison and transfer of data. The standard format should provide sufficient information for completion of the DWAF O&M report for Rural Water Supply Schemes.

Finally, it is recommended that the WRC Rural Water Supply Cost and Tariff Model is updated according to the evolving needs of the model's users, and according to the observations made from the ongoing monitoring of rural water projects. Ideally, the up to date model should be available to the public from a website.

Acknowledgments

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DEVELOPMENT OF A FRAMEWORK FOR THE CALCULATION OF A MONTHLY TARIFF PAYABLE IN STAND-ALONE COMMUNITY WATER SUPPLY SCHEMES

The Steering Committee responsible for this project consisted of the following persons:

Project Steering Committee:

Dr G. R. Backeberg Water Research Commission (Chairman)

Mr J. N. Bhagwan Water Research Commission

Mr B Jackson Development Bank of Southern Africa

Mr C. J. Williams Economic Project Evaluation Pty Ltd

Mr I. Palmer Development Group

Dr A. Shaker National Community Water and Sanitation Training Institute

Mr H. Sussens Department of Water Affairs and Forestry
Ms M. T. Rakgoale Department of Water Affairs and Forestry

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Chapter One

Introduction

In 1981 the United Nations launched the International Drinking Water Supply and Sanitation Decade. The aim of the Decade was to bring about safe water and sanitation for all the people of the world. During the Decade, some 1600 million people were served with safe water. However by the end of the Decade it was estimated that there were still over one billion people without safe water (WHO, 1997). The continent with the highest percentage of unserved people was Africa, with 43%.

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Professionals who have long worked in the public health sector are beginning to realise that new approaches are required to achieve sustainable rural water supply. For example, Middleton (1998) lists the following lessons after reviewing the success of the International Drinking Water Supply and Sanitation Decade:

- Sustainability is critical.
- Sustainable systems fit the needs of the people who are going to use them.
- Systems should be upgradable.
- Water supply and sanitation development should be balanced.
- Planning and implementing balanced water supply and sanitation is difficult.
- Affordability needs to guide development choices.
- Subsidies are undesirable; if they are essential, they should be carefully targeted.
- The public sector has not made enough use of the capacity of the private sector.
- Privatisation needs strong, honest regulation.
- The role of the government should move from that of provider to that of facilitator and regulator.
- Full use should be made of community capabilities.
- Public education is essential.

Over the last few years, a consensus has also emerged on the principles to guide the provision of rural water supply. Internationally, policies call for treating water as an economic and social good managed at the lowest appropriate level. For the provision of water supply this requires that

consumers be engaged in the process of selecting, financing and operating systems that meet their demands and willingness to pay.

Managing water as an economic good has strong implications for the establishment of proper financial arrangements for a project. Financial policies should send out correct signals linking service levels to actual cost, maximise cost recovery by capturing community willingness to pay, and make efficient and equitable use of subsidies. No matter how simple a given project might be on a technical level, provision of rural water services is always institutionally complex, involving a wide range of stakeholders. The community should always play a leading role, selecting and employing various goods and services provided through an incentive structure which exploits the comparative advantage of all participating organisations. The existence of a legal framework including property rights for all resources and facilities, and legal recognition of the community organisation charged with managing the facilities is crucial.

The increasing perception of water as an economic good has contributed to the shift away from top-down, supply-driven approaches to service delivery, or *demand-responsive* approaches. Such approaches provide greater choice for users and encourage scope for private sector and non-governmental organisation involvement in the implementation of rural water projects. Sustainable rural water supply in a demand - responsive approach involves more than giving communities choice about service levels. It requires changing the way projects are implemented so that they shift to community management and financing (UNDP-World Bank Water and Sanitation Program, 1998).

In common with other parts of the developing world, the rural water sector in South Africa has been heavily subsidised for some time. Prior to the transition to universal franchise in 1994, government programmes in rural areas tended to focus on handpumps and windmills. These more simple water supply solutions (which due to institutional problems did not necessarily work) were thus associated with the "old" South Africa and regarded as third-class. Since 1994 the almost universal drive in the sector has been to get a piped water supply to within reach (classified as 200 metres) of every home. This is the standard practically every community aspires to, and delivery on this standard carries a very high political premium. However, it is being found that, again due to institutional problems, these reticulated schemes are, if anything, even more prone to failure than the old handpumps and windmills. The government's response to the problem of the poor sustainability of rural water supply has been to give an undertaking, on behalf of local government, that every family is entitled to 6 kl of water per month free of charge. In rural areas this undertaking is to be financed by local government primarily by using a portion of a grant (the Equitable Share) which has been made available to them for the purpose of making basic services affordable to the poor. It is expected that the more rural councils in South Africa may require at least three years to implement the free water policy, and it is realised that in some areas it may not be possible to meet the promise at the level of service implied by the policy (Department of Water Affairs and Forestry, 2001).

In this context, with international practice pushing towards increasing independence of government, down to the lowest level possible, and South African practice pushing towards increasing dependence on government, it is particularly relevant to ask the question: how much does rural water supply cost, anyway? How much does it cost national government, how much does it cost local government, and how much does it cost the body actually responsible for making the water supply work. The cost is highly dependent on many variables, such as the capital cost, the need to pump, or not, the need for ongoing support, or not, and the effectiveness of management. For example, all other things being equal, one scheme which has high transmission losses, low consumption levels and high levels of bad debt, could find that its water cost is ten or twenty times that of a scheme which has all those conditions optimised.

This study reviews the literature, local and international, studies a number of water tariffing models which are used in the sector, and goes on to examine the legal and political framework in which water supply operates in South Africa. Thereafter a new model is described, a model which has been developed particularly for the evaluation of costs and tariffs for rural water supply schemes. The model is fairly simple to understand and use, and yet it can accommodate virtually any combination of subsidies, service levels and tariffing options.

It can be used either at the planning stage to investigate the economic viability of a scheme, or as a tool during the operational phase to test different tariff scenarios.

It can also be used in order to provide a common frame of reference in order to compare competing water supply technologies. For example, how much cheaper, really, is the water obtained from a handpump, than that obtained from a tap? How much cheaper to the user, and how much cheaper to the funder?

1.1 Research Objectives

The objectives of this research were set out in the original proposal as follows:

- To determine the minimum factors which constitute the monthly running costs of standalone community supply schemes to ensure that the schemes are operated and maintained in a sustainable manner utilising local resources.
- To obtain empirical data for the monthly running costs from existing water supply schemes, hence
- To develop a financial framework, which provides guidelines to consultants, planners and local authorities on the basic monthly running costs of such schemes.

1.2 Report Structure

Chapter 2 reviews local and international experience with the management of rural water supply schemes.

Chapter 3 gives a brief outline of South African legislation and policy as it affects rural water supply.

In Chapter 4, a review of the costing models in the water supply sector is presented, with a focus on operation and maintenance aspects.

Chapter 5 presents the methodology used for the survey of operation and maintenance costs at the community level on a number of projects in four different provinces of South Africa, and discusses some of the lessons learned from the data and the data gathering exercise.

Chapter 6 describes the Cost and Tariff model developed in the course of this project.

Chapter 7 discusses the results obtained when the Cost and Tariff Model is applied to the schemes surveyed, as well as to other types of rural water supply.

Chapter 8 draws conclusions from the study, and makes recommendations for the further use of the model.

Chapter Two Literature Review

2.1 Water supply coverage

The most recent WHO statistics indicate that in 2000, 1.1 billion people, or 18% of the world's population, did not have access to safe water. Although 800 million people have been served with water in the last decade, this has only just kept pace with the growth in the world's population, and thus the backlog has not changed in over a decade. There is a need not only to provide new facilities, but also a critical need to sustain existing ones through adequate operation and maintenance systems. Making water supplies a sustainable reality in the developing world is a major challenge, especially in small water systems which often lack technical, financial and human resources for proper and efficient operations.

In 1990 dollars, World Health Organisation figures suggest that the requirements to eliminate the present backlog would be about US\$81 billion (WHO, 1997). However to meet the WHO target to eliminate the water supply backlog by the year 2025 (by which time the world's population would have increased to over eight billion), a budget of US\$247 billion will be required. This figure of US\$20 billion/year in 1990 dollars is compared to the US\$13 billion/year which was spent in the International Drinking Water Supply and Sanitation Decade, 1981-90. If this kind of money is to be invested in water supply, there needs to be some confidence on the part of taxpayers that the money is not going towards building fundamentally unsustainable infrastructure.

2.1.1 Information in developing countries

Access to information in developing counties is limited. There are multiple reasons for this, ranging from economic, social, cultural and political factors to lack of an adequate infrastructure that allow information flows within the country. In general, national governments have been in a privileged position in most developing countries when it comes to getting information on specific developmental issues. Even so, many key decision makers in government cannot obtain the upto-date information they need to implement policies. Other sectors of civil society like nongovernmental organisations (NGO's), academic and national businesses, who can and should also play a key role in development issues within their countries, have had even less access to information. It is common to find more information for a specific developing country on an Internet server located in Washington DC, for example, that in the country itself. Moreover, within most countries the little information that exists is either in private hands and/or it does not flow out of government institutions. This lack of information impairs the ability of water managers in developing countries to make informed decisions (Kibata, 1996). There is a need to equip water and environmental sanitation managers in these countries with information capable of assisting them in formulating solutions for a range of water and environmental sanitation challenges (Urbanisation Working Group of Water Supply and Sanitation Collaborative Council, 1993). On the other hand, while exchange of information between developing countries is low, the most practical solution to water and environmental sanitation challenges is to be found among the developing countries themselves. In the past, transferring first world technology to the realities of developing countries, has at times proved inappropriate, costly or both.

2.2 Promising Solutions

The Water and Sanitation decade has demonstrated that massive investment programs cannot alone solve problems in the sector. In reviewing the lessons from the Decade, Middleton (1998) concluded the following:

- Sustainability is crucial
 - There is no point in building systems that fail on commissioning due to lack of funds, skills, spare parts, or competent management of operation and maintenance.
- ii) Sustainable systems fit the needs of the people who are going to use them. This means those people have to be involved in planning. Community participation is needed in order to ensure that systems are culturally acceptable, affordable, and meet people's expectations.
- iii) Systems should be upgradable to higher levels of service.
- iv) Water supply and sanitation development should be balanced.
 The health and environmental impacts of providing more water without sanitation considerations are negative.
- Planning and implementing balanced water supply and sanitation is difficult.
 Ways should be found of co-operation between organisations responsible for the two sectors.
- vi) Affordability needs to guide development choices.
 Planning should always start from the needs of the community, which means that affordability must also be considered. This should be based on reflection of all the costs including wastewater and the environment.
- vii) Subsidies are undesirable; if they are essential, they should be carefully targeted. The needs for subsidies should be minimised by designing affordable systems.
- viii) The public sector has not made enough use of the capacity of the private sector. Many water supplies in developing countries are intermittent and inefficient. The prices paid to water vendors by people who have no municipal service exceed charges by a monopolistic water company. Using the private sector, or converting municipal utilities to private or publicly owned commercial enterprises, can bring substantial efficiency benefits that should eventually translate into better, more widespread service.
- Due to the monopolistic nature of water supply services there is always a risk of abuse in terms of poor quality of service, discrimination in the provision of service, or excessive profiteering. To avoid this, strong control by a government agency is needed. The lack of sufficient capacity to draft or enforce regulations in developing countries makes it difficult. This is especially so where inexperienced developing countries are negotiating long term contracts with highly experienced expatriate companies. Due to the expensive nature of

expatriate companies, it would be more cost effective to train local staff to form their own management companies with external assistance, rather than hand over national assets for a period of years to expatriate companies reporting to overseas shareholders. Small systems in particular may be better managed by community-based organisations, provided that they are properly trained.

 The role of the government should move from that of provider to that of facilitator and regulator.

The role of the government should be in <u>setting more appropriate standards</u> for the sector, establish revolving funds for sector development and encourage the flow of private funds into the sector. The control of the use of water resources to ensure efficient utilisation and conservation is also the government's responsibility.

- xi) Full use should be made of community capabilities.
 Whichever mechanisms are adopted to improve community water supply, the community must be involved. Players in the sector will have to judge the appropriate role and the correct time.
- xii) Public education is essential Communities need to be kept informed regarding what is happening in the sector, what their technical options are, what these will cost them, how they can get help and how they can participate in planning affecting their lives.

2.3 The Demand - Responsive approach

The four overarching principles which form the basis of the demand-responsive approach are:

- Water should increasingly be managed as an economic as well as a social good.
- ii) Management should be focused at the lowest possible level.
- iii) A holistic approach to the use of water should be employed.
- iv) Women should play a key role in the management of water.

(UNDP - World Bank Water and Sanitation Program, 1998).

2.3.1 Understanding the Demand-Responsive Approach

2.3.1.1 Managing water as an economic good: The transition from supply-orientated to demand-responsive services

Water has come increasingly to be viewed as an economic good. This change in thinking has contributed to the shift away from top-down supply-driven approaches to service delivery. Demand-responsive approaches provide greater choice for users and encourage more private sector and NGO involvement in the implementation of rural water supply projects. Successful transition from a supply-driven to a demand-responsive approach requires stakeholders to:

 Develop rules that give users the incentive to reveal their demand and give the supply agency an incentive to act on that information.

- Develop implementation procedures that encourage adherence to the rules and transparency in their application.
- iii) Actively monitor performance.
- Give regular feedback on performance results to users and supply agencies so that they can modify rules and implementation procedures accordingly.

2.3.1.2 The link between demand-responsiveness and sustainability: Evidence from a global study

The UNDP-World Bank Water and Sanitation Program carried out a study in six countries. The study aimed to clarify what is meant by demand-responsiveness in theory and practice and to measure, as well as quantify the impact of demand-responsiveness on the sustainability of rural water systems. The study was carried out over a one year period by field-based teams in Benin, Bolivia, Honduras, Indonesia, Pakistan and Uganda. The study found that employing a demand-responsive approach at the community level significantly increases the likelihood of water system sustainability. However it also found that even programmes that have adopted this approach tend to apply it inconsistently among the communities where they work (UNDP-World Bank Water and Sanitation Program, 1998).

The study found that to be effective, a demand-responsive approach should include procedures for an adequate flow of information to households, provision for capacity building at all levels, and a re-orientation of supply agencies to allow consumer demand to guide investment programs. The study also found that the existence of a formal organisation to manage the water system and training of household members are significant factors in ensuring water system sustainability. Positive correlations were also found between water system sustainability and water committee training in operation and maintenance, and the quality of construction of the system and water system sustainability, although these findings are less consistent across countries.

2.3.1.3 Giving communities choice is not enough

Sustainable rural water supply and sanitation in a demand-responsive approach involves more than giving communities choice about service levels. It requires changing the way projects are implemented so that they shift to community management and financing of implementation. This implies new roles for supply agencies and the need for a concerted effort to overcome resistance to change. Overcoming such resistance requires an enabling policy environment, the establishment of greater trust between governments and communities, provision of support and training, and steps to help the private sector better provide goods and services and simplify contracting procedures.

2.3.1.4 Lessons learnt

Although there is no easy formula in ensuring sustainability of small water supply systems, there are general measures that contribute to reaching this objective:

- Formulation of the water supply project together with the community as a means to ensure the feasibility of the proposal.
- Establish a sound management scheme for each system taking advantage of the existing institutional resources, such as water board associations, water services, NGOs, and the participation of private companies.
- Set up a supportive scheme for small water supply systems, facilitating the availability of specialised services required for the operation, maintenance and management of those systems.
- Define and establish a decentralised scheme to supervise the operation of these schemes, using institutions closer or next to them that would act in compliance with official regulations.
- Incorporate water supply projects into income generation projects, or establish coordination among them.
- Assemble an interagency group to prepare guidelines for the formulation of small drinking water supply system projects taking into account the proposed measures.
- vii) Identify and evaluate projects with twofold objectives: drinking water supply and income generation, and disseminate the results so that other countries and communities can benefit from the experiences of successful projects.

2.3.1.5 Paraguay's approach

In some countries the traditional administrative water boards operating rural areas are a good example of sound management. In Paraguay, their recognition is well established. To strengthen them, they are being grouped together under associations to provide technical assistance to small boards and even to install and operate new systems.

The strengthening of the boards will occur within a process in which the government will progressively leave its role as constructor.

The study shown in Table 2.1 was conducted in 1991. Socio-economic studies and surveys were conducted in 13 rural communities of different population sizes. Monetary amounts are given in thousands of Guarani (G/.), which had a conversion rate of G/. 1320 = US\$1.00 as of September 1991. The total cost represents a water system consisting of a deep well, pumping equipment, elevated water storage tank, a distribution system, and house connections. The connection cost in this case represents the capital cost per family for the whole water system. Family income represents an average monthly income for the families in the community. Total monthly payment includes payment of the loan plus the cost for the operation, maintenance and reserve of equipment. Percentage of family monthly income represents the percentage of family income dedicated to payment for water supply.

This analysis shows the ability and capacity of the community to meet costs of the system that links drinking water services to the development process of the community, i.e. the process that improves income levels in the communities (Caporali, 1998). For comparative purposes it also shows the average monthly electricity payment for each scheme.

Table 2.1 Paraguay Third Rural Water Supply and Sanitation Project Affordability Study:

(Caporali, 1998). Note, all currency in the table is denoted in 1000s of guarani (G/k), and in September 1991 1320 guarani was equal to 1 US \$. To convert from 1000s of 1991 guarani to 2001 rands (using a 1991 R/\$ exchange of 2.5:1 and escalating by 10% per annum for ten years), multiply the G/k figures in Table 2.1 by a factor of 4.9.

| Family Income | Name | Name | Name | Pop | House Conn. | Total Cost | Conn | Initial Contribution | | Loan Repayment | | | O&M Costs | Total Monthly Payment | | Elect. Tariff |
|------------------|----------------------|------|------|--------|----------------|---------------|--------|-------------------------|----|----------------|-----------------------------|-----------------|-----------------|--------------------------|-----|------------------|
| | | | | | | GA | * | Sum (G/k) | % | Yrs | Monthly Payment (G/k) | (Conn. (G/k) | /Conn. (G/k) | % of Family Income | G/k | |
| 280 | San Cristobal | 221 | 67 | 79108 | 1181 | 15 | 177.11 | 30 | 10 | 6.86 | 6.5 | 13.36 | 4.78 | 24.5 | | |
| 189 | Itanara | 421 | 86 | 96246 | 1119 | 15 | 167.87 | 30 | 10 | 6.50 | 7.0 | 13.50 | 7.14 | NA | | |
| 308 | A Tranquera | 2015 | 395 | 278008 | 704 | 15 | 105.57 | 30 | 5 | 5.6 | 3.7 | 9.3 | 3.02 | 28.00 | | |
| 348 | Captain Miranda | 836 | 190 | 149714 | 788 | 15 | 118.20 | 30 | 5 | 6.72 | 5.5 | 12.22 | 3.51 | 33.94 | | |
| 142 | San Pablo | 537 | 116 | 107021 | 923 | 15 | 138.39 | 30 | 10 | 5.35 | 6.8 | 12.15 | 8.58 | NA | | |
| 141 | Yataity del Norte | 1156 | 236 | 189098 | 801 | 15 | 120.19 | 30 | 10 | 4.63 | 3.9 | 8.53 | 6.05 | 7.59 | | |
| 116 | Lopza Moreira | 942 | 190 | 177973 | 937 | 15 | 140.51 | 30 | 10 | 5.44 | 5.3 | 10.74 | 9.23 | 6.74 | | |
| 249 | Bolon | 1008 | 221 | 222852 | 1008 | 15 | 151.26 | 30 | 7 | 6.73 | 5.3 | 12.03 | 4.83 | 8.24 | | |
| 251 | Los Cedrales | 1716 | 330 | 185443 | 562 | 15 | 84.29 | 30 | 5 | 4.47 | 3.5 | 7.97 | 3.18 | 20.00 | | |
| 307 | Piquata Cue | 3261 | 649 | 275620 | 425 | 15 | 63.70 | 30 | 5 | 3.38 | 3.4 | 6.78 | 2.21 | 13.33 | | |
| 276 | Cazadita | 2451 | 462 | 274529 | 594 | 15 | 89.13 | 30 | 5 | 4.73 | 3.9 | 8.63 | 3.13 | 11.73 | | |
| 255 | Caguaza | 2451 | 473 | 263057 | 556 | 15 | 83.42 | 30 | 5 | 4.43 | 3.9 | 8.33 | 3.26 | 13.46 | | |
| 345 | Laureity | 7017 | 1493 | 822119 | 551 | 15 | 82.60 | 30 | 7 | 3.67 | 3.9 | 7.57 | 2.13 | 12.27 | | |

2.4 Relative Water Costs

Regardless of how the capital required for water supply projects is financed, if recurrent costs can be borne by the community then there is some chance that the scheme can be sustainably operated. For this reason it is important to understand the relative operation and maintenance costs of various water supply options. Table 2.2 shows the estimated operation and maintenance costs of various water supply systems or components in rural areas of South Africa.

Table 2.2 Operation and maintenance costs of various water supply systems in rural areas (excluding caretaker allowance/salary) (1990 prices) (CSIR, 1991). Note, to convert from the figures in this Table to 2001 rands, multiply by 3. To convert to 2001 US \$, multiply by 0.37.

| SYSTEM | COST RANGE (R/annum) | | | |
|---------------------------------------|----------------------|--|--|--|
| Spring Protection Works | 30 - 250 / system | | | |
| Rainwater Collection Systems | 10 - 50 / household | | | |
| Hand Pump on a Borehole | 50 - 150 / pump | | | |
| Diesel Pump on a Borehole | 500 - 5000 / pump | | | |
| Electric Pump in a Borehole | 400 - 4000 / pump | | | |
| Wind Pump on a Borehole | 150 - 800 / pump | | | |
| Package Treatment Plant (<100 kl/day) | 200 - 4000 / system | | | |
| Distribution Network | 50 - 1000 / system | | | |
| Distribution Network | 50 - 1000 / system | | | |

The affordability of any of the above options depends on the number of families sharing the supply, and the combination of costs applicable to that scheme. It can, however, be seen that the more significant running costs are associated with the treatment and pumping of water. If these costs can be shared amongst enough homes, the cost of the water supply is not necessarily higher than the simpler options such as handpumps and spring protection works, which are practically limited to a small number of homes. However, the exclusion of the caretaker costs and also external support costs is significant, and thus Table 2.2 does not give a clear cost comparison between different water supply options. The development of a model to make that comparison is the main objective of this study, and is discussed in detail in Chapter 6 of this report.

Rivett-Carnac (1984) analysed the relative costs of various supply technologies in KwaZulu-Natal, South Africa, during the period 1980 to 1984. The results of that study are shown in Table 2.3 below. In KwaZulu-Natal today (Chapter 5 refers) the typical urban water tariff is R3.50/kl, and that for a standpipe water supply is often R10/kl - i.e. the ratios given in Table 2.3 appear to be as relevant today as they were in 1984.

Table 2.3 Relative unit costs of various water supply technologies (Rivett-Carnac, 1984)

| SOURCE | RANGE OF UNIT COSTS (relative to municipal tariffs) |
|---|--|
| Protected springs | 0.098 to 0.213 |
| Wells (6m deep) | 0.098 to 0.213 |
| Wells (6m deep) | 0.114 to 0.454 |
| Boreholes (30m deep with hand pump) | 0.187 to 0.748 |
| Municipal tariff (taken as unity for comparison) | 1.0 |
| Public standpipes (connected from municipal system) | 3.34 |
| Rainwater collection and storage | 3.58 to 7.78 |
| Mobile tanker supply | 9.17 |

Notes:

- i) Unit costs are <u>relative</u> to municipal water tariff, which are thus assumed to be unity. It is assumed that the public standpipe supply buys water at the municipal tariff and redistributes it from public standpipes controlled by a paid attendant. Operation and maintenance of the reticulation is covered from the sale of water.
- ii) Unit costs are for equal volumes of water and have been arrived at from analysis of the installation costs, the number of users, the per capita consumption and the design life of the system, in the case of springs, wells, boreholes, and rainwater systems.
- iii) Unit costs in the case of mobile tanker supply are based on capital costs plus operation cost divided by the volume of water supplied.

Of interest in the above figures is the large range of costs from the lower to the upper end of the scale (from protected springs to mobile tankers) <u>both</u> of which would be considered of low amenity and accessibility value. In contrast municipal water supplies, which have the greatest amenity, occupy the middle ground in terms of cost.

2.5 Umgeni Water Schemes, South Africa

Umgeni Water is a water utility whose core business is the provision of water supply to the urban and industrial centres of Durban and Pietermaritzburg in the KwaZulu-Natal province of South Africa. Since 1987, however, Umgeni Water has been extending its supply network to include a number of peri-urban and rural communities. Umgeni Water is now amongst South Africa's most experienced institutions as far as peri-urban and rural water supply is concerned, and thus its experience is worth studying.

2.5.1 Customer Profile

Table 2.4 gives an indication of the distribution of different categories of Umgeni Water's clients with respect to account values and numbers of accounts as well as indicating the current situation with respect to Umgeni Water's general success with respect to cost recovery. The first column

gives a short description of the account type. The first group of accounts is related to water supplies delivered exclusively to developing communities. The second group relates to bulk supplies, some delivered to developing communities and some to established communities. The third and last group relates to water supplies delivered exclusively to established communities. The first group is divided into three further subgroups:

- Supplies where Umgeni Water accepts responsibility for the operation, maintenance, and management of the distribution system and therefore interacts with <u>all</u> the individual consumers in the area including households with individual private connections, metered standpipe operators and institutions such as schools and churches.
- ii) Supplies to village level water committees where Umgeni Water has no direct contact with individual customers but accepted responsibility for institutional capacity building and general skills training so the Water Committees can carry out responsibilities as village level water service providers; and
- Bulk supplies where Umgeni Water has no responsibilities for distribution and no contact with village level committees or with individual consumers.

The column on "percent of total current debt" examines the Umgeni Water debt, which equals the total invoiced amounts. This indicates that in excess of 28% of Umgeni Water income is derived from water delivered to developing communities. However all but 0.23% of this debt was with major institutions such as the KwaZulu Government Service and the Edendale Complex Town Manager. Thus whilst developing communities were a major client, Umgeni Water was at the time only responsible for recovering costs directly from customers representing 0.23% of the total turnover.

The columns on percent of total number of accounts illustrates that whilst the value of accounts for which Umgeni Water is responsible for recovering costs directly from consumers residing in developing communities is small, these accounts do represent over 96% of all accounts related to water sales. The last sets of columns relate to the average and the median value of individual account types and the outstanding debts associated with them. Important items to note from these columns are the low average account values for the private connections and the individual institution connections associated with developing communities (and median values are below the mean values - see Figure 2.1, for example). These low account values have been one of the many factors which has made the administration of schemes delivering water to developing communities difficult and which has resulted in Umgeni Water trying various alternative methods of cost recovery and community participation.

Table 2.4 Analysis of Umgeni Water debtors for a typical month in 1994 (Hazelton and Kondlo, 1998). Note: To convert from 1994 rands to 2001 rands multiply by 1.95.

| Account Type | Total current month | Percent of total current debt | | Number of accounts | Percent of number of accounts | of | Average account value | Total debt R | Debt ratio Total/ |
|---------------------------|---------------------------|----------------------------------|----------|--------------------------|-------------------------------|----------|-----------------------|-----------------|-------------------------|
| | debt R | Indiv % | Cum % | | Indiv % | Cum % | R | | Curr. |
| Developing Communities | | | | | | | | | |
| Private connection | 23,630 | 0.09 | 0.09 | 1151 | 88.13 | 88.13 | 21 | 77,782 | 3.29 |
| Metered standpipes | 10,487 | 0.04 | 0.13 | 36 | 2.75 | 90.88 | 291 | 85,812 | 8.18 |
| Water kiosks | 174 | 0.00 | 0.13 | 4 | 0.31 | 91.19 | 43 | 261 | |
| Individual Inst | 2,497 | 9.01 | 0.14 | 48 | 3.67 | 94.65 | 52 | 15,943 | 1.50 |
| Water committee | 23,940 | 0.09 | 0.23 | 7 | 0.54 | 95.43 | 3,420 | 200,277 | 8.37 |
| Bulk inst. | 7,640,256 | 28.41 | 28.64 | 16 | 1.23 | 96.63 | 477,516 | 17,957,604 | 2.35 |
| Sub-Total Dev. Com. | 7,700,984 | 28.64 | 28.64 | 1262 | 96.63 | 96.63 | | 18,337,679 | 2.38 |
| Mixed Communities | | | | | | | | | |
| Bulk inst. | 10,255,730 | 38.14 | 38.14 | 2 | 0.15 | 0.15 | 5,127,865 | 13,929,915 | 1.36 |
| Sub-Total Mixed Com. | 10,255,730 | 38.14 | 38.14 | 2 | 0.15 | 0.15 | 5,127,865 | 13,929,915 | 1.36 |
| Est. Communities | | | | | | | | | |
| Private Conn. | 3,411 | 0.01 | 0.01 | 19 | 1.46 | 1.46 | 180 | 6,051 | 1.77 |
| Individual Inst. | 261,343 | 0.97 | 0.98 | 9 | 0.69 | 2.15 | 29,038 | 693,184 | 2.65 |
| Bulk Inst. | 8,667,078 | 32.23 | 33.22 | 14 | 1.07 | 3.22 | 619,077 | 9,790,422 | 1.13 |
| Sub-Total Est. Com. | 8,931,831 | 33.22 | 33.22 | 42 | 3.22 | 3.22 | 212,663 | 10,489,657 | 1.17 |

Figure 2.1 shows the distribution of household water usage for house and yard connections in a selection of peri-urban and rural communities supplied by Umgeni Water. In this selection the median consumption was found to be 8 kl/month.

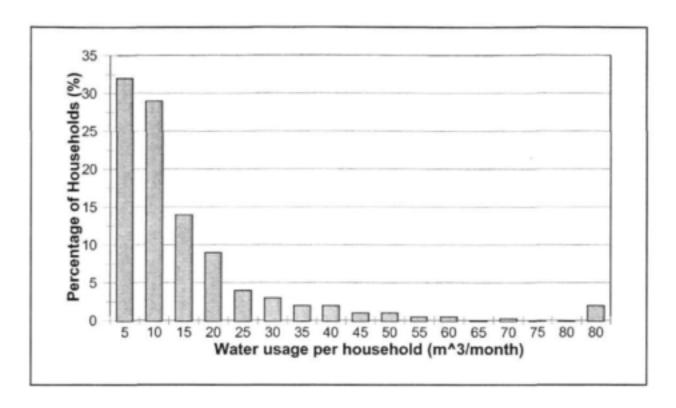


Figure 2.1: Household water usage for house and yard connections in the study area (Hazelton and Kondlo, (1998). Notes: 1) The study area comprises developing communities in Umgeni Water supply area, sample size: 1847 households, average consumption: 14m³/month, median consumption 8m³/month. 2) The average consumption derived from a different set of figures (see Table 2.6) was 8.57 kl/month.

2.5.2 Cost-recovery methods employed by Umgeni Water in rural areas

2.5.2.1 Flat Rate Standpipes

This type of standpipe was first installed in a few communities like Ntshongweni and Georgedale during the 1982 drought, which was followed by a cholera epidemic. The standpipes were situated along the roads in public places. The responsibility for collecting the fixed flat rate monthly charge from customers was given to the tribal authorities controlling the different areas. Community members made payment at the magistrate's court and the magistrate was then responsible for paying Umgeni Water. The system worked until the mid-eighties when political unrest set in, after which payment ceased. In addition the flat rate system was found to be unpopular due to the different proximity of the water supply to various people. The absence of metering also resulted in a lack of information on the cost of the supply. The standpipes were therefore later converted to metered community standpipes with water kiosks (Hazelton and Kondlo, 1998).

2.5.2.2 Metered Community Standpipes and Water Kiosks

With metered community standpipes the overall control is the responsibility of the Community

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- 15

Water Committee and it is the committee's responsibility to collect the money from any person they identify to run the standpipe in their name. For the water kiosk system a water shop is created at a standpipe. The community through its water committee identifies a local entrepreneur who is allocated a kiosk. This entrepreneur is responsible for the collection of money for water sold and for the payment of accounts to Umgeni Water. The tariff paid at the kiosk is set with Umgeni Water's advice with the aim of making the whole exercise worthwhile for the entrepreneur whilst keeping the price within that which the customers will accept.

The disadvantage of these systems is that to be economically viable they should be positioned in such a way that the number of households using each standpipe or water kiosk is large. This should be enough to enable the attendant to earn sufficient income without charging the customers too high a tariff for the water. Due to the low population density of the communities and the irregular opening hours the kiosks have been found to have low acceptance and to be prone to vandalism. Metered community standpipes in general present large debt ratios (Figure 2.2). (Hazelton and Kondlo, 1998).

2.5.2.3 Metered Shared Standpipes

This relates to an intermediate level of service between a metered community standpipe and a private connection. The main difference between a shared standpipe and a community standpipe is that shared standpipes are provided in the name of the individuals who control them and are fully responsible for them, whereas community standpipes are usually in the name of a Water Committee which controls them and is responsible for them. Shared standpipes are situated in the responsible persons's yard rather than in a public place. Shared standpipes are operated in two ways. The standpipe owner can either sell water at a profit or divide the bill equally amongst the households that get water from the standpipe (Hazelton and Kondlo, 1998). Whilst Umgeni Water indicated that these standpipes have higher acceptability and applicability than other communal options, this is however challenged by the high outstanding debts (Figure 2.2). Due to metered shared standpipes being registered as private connections, more thorough analysis is difficult.

2.5.2.4 Private Individual Household Metered Connections

In this type of connection meters are read monthly and the invoices sent to each individual household by Umgeni Water. There are indications that the cost recovery for these connections is relatively better than that for shared standpipes. As Figure 2.3 indicates, 73% of the customers pay their accounts within 90 days. It also indicates, however, that there are a significant number of customers from whom it is difficult to obtain payment. Some of these are customers whose bills were above average had reduced their consumption to pay off their debt whilst others have been disconnected and were being billed the minimum R5.70/month charge. The coverage of private connections in community water supplies is low (10% of a representative selection of communities in 1993). Cost recovery would therefore change with increased coverage (Hazelton and Kondlo, 1998).

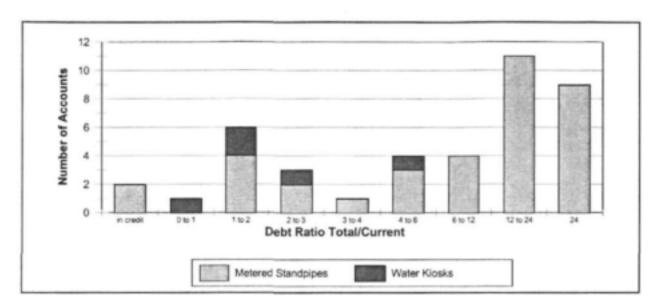


Figure 2.2: Frequency and value distribution of debt ratios for metered standpipes and water kiosks for developing communities supplied by Umgeni Water (Hazelton and Kondlo, 1998).

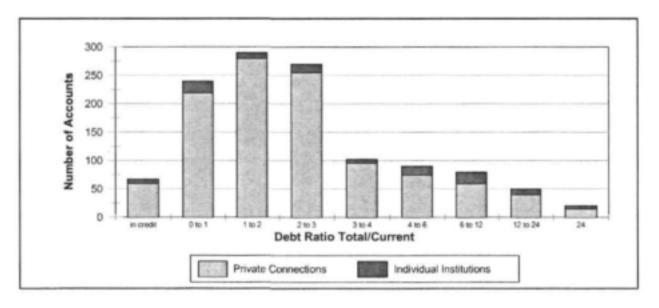


Figure 2.3: Frequency and value distribution of debt ratios for individual institutions and private connections supplied by Umgeni Water (Hazelton and Kondlo, 1998). Notes: Credit in this case means that no debt is owed. The debt ratio is calculated from the total debt (i.e. current month plus arrears) divided by the current debt (i.e. the current month).

2.5.2.5 Community Operated Water Supply Systems

The core business of water utilities such as Umgeni Water is bulk water supply. It is thus the longterm ideal that a community level organisation take responsibility for paying the bulk water account, and see to the management of the reticulation and the recovery of costs. Schemes operated in this way are QadiNyuswa, Lower Ngcolosi, Mpolweni, Inqunqulu, Embo and Mseleku. These schemes have been owned by the communities since construction. While these communities do periodically seek advice from Umgeni Water to solve their maintenance problems they do otherwise maintain a high degree of self-reliance. The consistent existence of an operating surplus in two of them indicates a satisfactory level of approval and confirms the claims in the literature that the higher the level of community participation the greater the possibility of sustainability. Figure 2.4 gives an indication of the sort of profile required to keep any water service provider in business and therefore can be used for setting final targets that are to achieved over time with adequate capacity building, ongoing monitoring and support, appropriate levels of service and good cost recovery methods (Hazelton and Kondlo, 1998).

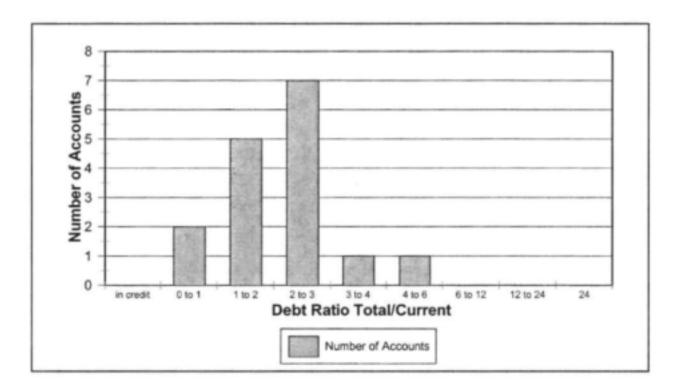


Figure 2.4: Frequency and value distribution of debt ratios for institutional bulk buyer representing developing communities supplied by Umgeni Water

Notes: Credit in this case means that no debt is owed. The debt ratio is calculated from the total debt which is the historical monies owed divided by the current debt which is the previous month monies owed.

2.5.3 Income and expenditure figures from rural schemes

Table 2.5 shows the average monthly operation and maintenance costs for a number of Umgeni Water rural water schemes as supplied by Umgeni Water's Finance and Administration Department.

Table 2.5: Average monthly operation and maintenance costs during the period June 1994 to May 1995 for 10 water schemes (Hazelton and Kondlo, 1998)

| Scheme Name | Bulk Sales R/month | Unaccounted for Water R/month | Administration R/month | Operation R/month | Maintenance R/month | Total Costs R/month |
|-------------------------|--------------------------|-------------------------------------|---------------------------|----------------------|------------------------|---------------------------|
| Fredville | 10,180 | 4,682 | 6,497 | 346 | 19,798 | 41,503 |
| Georgedale | 8,594 | 2,368 | 2,531 | 210 | 5,680 | 19,383 |
| Groutville | 2,162 | 3,563 | 6,164 | 616 | 8,275 | 20,780 |
| KwaXimba | 11,847 | 4,698 | 7,123 | 3,229 | 26,787 | 53,684 |
| Manyanu | 1,119 | 984 | 1,286 | 240 | 46 | 3,675 |
| Ndwedwe | 3,534 | 897 | 3,173 | 85 | 6,100 | 13,789 |
| Ntshongweni | 5,432 | 1,293 | 1,391 | 331 | 4,851 | 13,298 |
| Phayiphini | 5,989 | 2,445 | 6,189 | 5,324 | 10,291 | 30,238 |
| Sankontshe | 5,984 | 2,771 | 594 | 86 | 5,227 | 14,662 |
| Table Mountain | 2,275 | 808 | 3,774 | 936 | 2,838 | 10,631 |
| Sub-Totals | 57,116 | 24,509 | 38,722 | 11,403 | 89,893 | 221,643 |
| % of Total | 26 | 11 | 17 | 5 | 41 | 100 |
| Average R/connection | 12.43 | 5.33 | 8.43 | 2.48 | 19.56 | 48.23 |

Note that on average 30% of the water supplied is unaccounted for.

Table 2.6 shows these total operation and maintenance costs for the same schemes compared with the payments received over the same period. This income represents between 80 and 90% of the billed amount over the same period. Thus even with 100% recovery of the billed amount the gross income would be less than 29% of the total O&M costs. This low percentage in turn reflects the need for high tariffs when water usage per connection is very low. The average water usage per connection for the ten schemes recorded in Tables 2.5 and 2.6, including shared connections is only 8.57 kl/month, significantly less that the average 14kl/month usage reflected for the sample used to plot Figure 2.2.

Table 2.6: A comparison between the average monthly operation and maintenance costs and the income during the period June 1994 to May 1995 for 10 water schemes (Hazelton and Kondlo, 1998). Note: to convert to 2001 rands multiply by 1.86.

| Scheme | Water | Number | Total | O&M co | sts | Gros | s Incor | ne | Subsidy | |
|---|------------------|---------|---------|--------|--------|---------|---------|--------|---------|--------|
| name | used kl/month | of conn | R/month | R/kl | R/conn | R/month | R/kl | R/conn | R/kl | R/conn |
| Fredville | 7021 | 845 | 41503 | 5.91 | 49.12 | 7996 | 1.14 | 9.46 | 4.77 | 39.66 |
| Georgedale | 5927 | 441 | 19383 | 3.27 | 43.95 | 10571 | 1.78 | 23.97 | 1.49 | 19.98 |
| Groutville | 1491 | 780 | 20780 | 13.94 | 26.64 | 2811 | 1.89 | 3.60 | 12.05 | 23.02 |
| KwaXimba | 8170 | 896 | 53684 | 6.57 | 59.92 | 10065 | 1.23 | 11.23 | 5.34 | 48.69 |
| Manyanu | 772 | 212 | 3675 | 4.76 | 17.33 | 780 | 1.01 | 3.68 | 3.75 | 13.65 |
| Ndwedwe | 2437 | 165 | 13789 | 5.66 | 83.57 | 3770 | 1.55 | 22.85 | 4.11 | 60.90 |
| Ntshongweni | 3746 | 179 | 30238 | 3.55 | 74.29 | 3372 | 0.90 | 18.84 | 2.65 | 55.45 |
| Phayiphini | 4130 | 637 | 14662 | 7.32 | 47.47 | 5785 | 1.40 | 9.08 | 5.92 | 38.39 |
| Sankontshe | 4127 | 246 | 10631 | 3.55 | 59.60 | 3951 | 0.96 | 16.06 | 2.59 | 43.54 |
| Table Mountain | 1569 | 195 | 3774 | 6.78 | 54.52 | 1687 | 1.08 | 8.65 | 5.70 | 45.87 |
| Totals and Averages | 39390 | 4596 | 212119 | 5.63 | 48.23 | 50788 | 1.29 | 11.05 | 4.34 | 37.18 |
| Water used/ connection & percentage of total | 8.57kl/r | month | | 100% | | | 23% | | 7 | 7% |

2.6 Capacity building and staff remuneration

Stand alone schemes and the reticulation pipework for villages supplied with water from larger schemes are best managed and cared for by the communities themselves, but for this to work there must be adequate capacity building, training, and follow-up support.

Management covers cost recovery, bookkeeping and financial reporting. Caretaking covers operation, day to day care and routine monitoring of the facility. If the community itself pays for these services it is expected that as sales grow the employment conditions would gradually change from occasional work on a voluntary basis to part time work for nominal pay, and then to full time work on a market related salary. For small communities it makes sense to train additional personnel to reduce the workload on individuals who are being paid very little to minimise the disruptive effects of people leaving the community. Meaningful participation in the planning and construction of the capital works paves the way for more active involvement in the operation of the scheme.

Table 2.7: Institutional arrangements for the operation and maintenance of water supplies within developing communities not integrated with established urban communities (Hazelton and Kondlo, 1998)

| Local Water or Development Committee | The elected committee appoints local community members to operate the scheme, care for it and implement cost recovery |
|--------------------------------------|--|
| Ward Development Forum | Operates as a 'stokvel' <3 for the management of maintenance funds from a number of communities. It is responsible for procuring spares and employing maintenance personnel from the private sector. |
| Local Government | Acts as the trustee for the management of loan finances and/or the building up of a capital fund for hardware replacement and upgrading. Local Government implement capital works with the assistance of consultants and contractors committed to labour intensive construction where practical. |

A stokvel is an informal organisation of community members which is recognised as a business entity.

Preventive maintenance and major repairs are a special case in that timely spares procurement, the expertise required to. Bulk schemes are best undertaken and operated by water boards whilst the private sector retains responsibility for major maintenance work.

2.7 Affordability of Operation and Maintenance Costs

Involvement of statutory bodies in the operation and maintenance work of community water supplies has been found to be ineffective and costly. Communities should operate, monitor, care for and manage their own schemes but leave all major maintenance work to local properly trained professionals. The contribution of the statutory bodies is then limited to facilitating an enabling environment and being a mediator between communities, maintenance companies and material suppliers.

It is now accepted that developing communities in general should pay for water (and other services) but there is little agreement in the literature on whether such communities can be selfsufficient even when only operating and maintenance costs are considered.

This can be done when the community accepts a central role in paying the operating and maintenance costs. Communities value goods they pay for more than free goods. Wastage is reduced, ownership and a sense of caring for an installation can be transferred to a community.

There is general agreement that once a minimum level of service has been provided the charges for higher levels of services should be related to the real costs of supplying the water but again not necessarily covering the full cost when minimum levels of consumption are being discussed.

The literature is however very inconsistent with respect to estimating different communities' ability to pay for these costs in full. A study carried out by the Netherlands Economic Institute (van Wildenburg, 1991, p. 20 and 21) reports that rural communities in Burkina Faso not only pay for all operation and maintenance but also set aside reserves for the replacement or extension of their water supply schemes. On the other hand another study done about the same time in the Netherlands (Besselink, 1992, p25) reports that generally maintenance costs exceed the financial capacity of villagers. It is therefore clear that each individual water supply scheme characteristics need to be assessed thoroughly before the sustainable tariffs are imposed on the community concerned.

Current median cash incomes in rural areas in South Africa are approximately R800/family per month¹. Assuming that an acceptable monthly cost of water supply is limited to 5% of monthly cash income (this is the rule of thumb often used), then the affordability limit for rural South Africa is approximately R35/family/month (2001 rands). The recurrent costs charged to the consumer should reflect this economic fact. This however ignores non-monetary payment possibilities, which are beyond the scope of this research.

2.8 Classifying water scheme operating and maintenance costs

The cost of operating water schemes can be subdivided into three classes of costs:

- costs which vary roughly proportional to the quantity of water delivered (variable costs);
- ii) costs which are fixed and mainly depend on design capacity of the scheme;
- costs which are unaffected by the capacity of the scheme or the quantity of water delivered but are roughly proportional to the number of connections installed.

Type I costs include: bulk water costs and the cost of internal reticulation boosting not included in the bulk tariff. Type II costs include: redeeming capital and/or building up a capital works replacement fund and main reticulation maintenance costs including any additional maintenance costs due to vandalism. In the case of Umgeni Water peri-urban schemes Type III costs include: costs associated with meter reading, computer billing, general accounting and administration, carrying out disconnections, community branch accounting offices and officers, maintenance of meters and connections, and unaccounted for water (UFW).

Mean income figures for for any municipality of South Africa can be accessed on the website maintained by the Department of Local Government and Housing. The figures are based on the 1996 census, and should thus be escalated by approximately 50% (or 8% per year compounded for five years) to get 2001 figures.

Chapter Three

South African Legislative and Policy Framework

Since 1994 the following key items of legislation or policy relating to water services provision have been produced in South Africa:

the 1994 White Paper on a National Water Supply and Sanitation Policy;

the 1997 Water Services Act (No. 108 of 1997);

the 1998 Draft Tariff Regulations for Water Services Tariffs (updated in 2000); and

the 2001 Guidelines for the Provision of Free Basic Water Services.

These are discussed in turn below.

3.1 White paper on a National Water Supply and Sanitation Policy for South Africa (1994)

This document provides the broad principles for financing the provision of water services. The paper deals with first "tier" water, namely the abstraction and provision of bulk raw water from a catchment. It does not deal directly with the second and third tier water, i.e. water processed (often by water boards) and transported to households.

The White Paper states that the full financial cost of supplying water should be recovered from water users. Full financial cost recovery cannot, however, be understood separately from social/equity objectives. This cost-recovery must be based on the principle that those who drive the marginal cost must pay the marginal price - this is the principle on which rising block tariffs are based. A rising block tariff provides a mechanism to discount the bill to those who use less than average amount of water, and to surcharge the bill to those who use more.

Financial cost recovery requires a financial unit cost of water to be calculated by apportioning the total costs of a water supply scheme to the total volume of water sales from that scheme.

The following components are incorporated into the calculation of this unit cost:

3.1.1 Capital costs

This comprises the amount required to recover the costs of assets required for the abstraction, impoundment and distribution of water. Such costs are determined through the mechanism of depreciation. Depreciation is the loss in value of facilities not restored by maintenance. It occurs through wear and tear, decay, inadequacy, or obsolescence (becoming outdated). Provision needs to be made to retain the capacity and functionality of all water schemes. This is done by making projections of future replacement and refurbishment costs for the depreciable portion of all property, plant and equipment.

3.1.2 Financial costs

These represent the cost of borrowing funds to purchase water infrastructure (interest and allied costs).

3.1.3 Direct operations and maintenance costs

Direct costs typically include administration costs, operations and maintenance costs, pumping costs, labour costs and overheads that can be attributed directly to a particular water scheme.

3.1.4 Indirect costs (overheads)

These are costs which cannot be directly attributed to a specific scheme but contribute towards the management and operation of the water resources of the entire country. An example is DWAF's head office costs.

3.1.5 Catchment management costs

Catchment management involves the activities that are required to maintain a water resource in a state that is satisfactory from both an ecological and a water resource point of view. Costs will typically be incurred for the eradication of alien vegetation, soil erosion protection, hydrological measurement, pollution control, regulation and law enforcement.

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

The Water Services Act (Act 108 of 1997), which was promulgated on 19 December 1997, describes in broad terms the roles and responsibilities of the various parties involved with the provision of water (and sanitation) services.

In terms of the act water services are the responsibility of local government structures such as District Municipalities and Metropolitan Cities. The statutory body holding the overall responsibility for water services in a given area is known as the Water Services Authority, commonly abbreviated to WSA. The body appointed by the WSA to actually provide water to a specific town or village, is termed the Water Service Provider, or WSP.

The Water Services Authority has the duty to ensure that access to potable water is progressively extended to all potential consumers in its area of jurisdiction, and that the service to those already served is reliable, affordable and of good quality.

The Water Service Provider is tasked with the day to day running of a scheme. This includes planning, operation, maintenance, billing, revenue collection and customer relations.

The Act recognises that in rural areas a village water committee may be formally appointed by the

Water Services Authority as the Water Service Provider. Such community-based WSPs may, if necessary, be assisted by another organisation appointed by the WSA, known as a Services Support Agent.

3.3 Draft Tariff Regulations for Water Services Tariffs in South Africa (DWAF 1999)

3.3.1 Revenue requirements

The South African Government operates in the context of limited resources and large service backlogs. Given these constraints, it is important that the water services sector becomes financially autonomous, in order to ensure the long-term sustainability. In order to achieve financial autonomy, it would be preferable if he full financial cost of supplying water be recovered from water users, including the cost of capita. Fixed assets (i.e. reservoirs, pumps, pipes, etc) represent a major cost component in the supply of water services. Therefore it is vital that some provision is made for the supply of these assets. Recipients of capital grants in the future will be required to take responsibility for the refurbishment and replacement of these assets. In order to sustain water services provision, it is therefor crucial that the refurbishment and replacement costs of water assets be built into tariff structures.

3.3.2 Fixed Charges

Regardless of the amount of water consumed there are fixed costs that are incurred by a water services provider, which need to be recovered. These fixed costs could be made up of, amongst others, the cost of meter reading, availability charges and fixed management and administration costs. The fixed charges may be considerable and are over and above the tariffs that are referred to above. Moreover these costs are defined as fixed in the sense that they are not related to the amount of water consumed.

3.3.3 Connection fees

The cost of connecting new water users is significant and therefore it is important that the service authority ensures that these costs are recovered. This can be done through direct connection fees. This is to avoid imposing costs on the rest of the water system

3.3.4 Water supply services to households provided through communal water service works

In rural areas water is typically supplied via communal standpipes. Sustainability of water supply systems is highly dependent on maintenance. Hence, local commitment to maintenance through the local contribution of resources (monetary and/or human) may be essential to the sustainability of water supplies. There are many different ways in which communal participation in the maintenance of communal water supply systems can be ensured. Meters can be installed on

communal standpipes or a water bailiff can be used to ensure that funds are recovered. Alternatively, community members can agree to share the overall costs of operating the water system, and contribute a fixed monthly payment. Whatever system is used, it is important that tariffs for water services reflect the cost of supply so that abuse and wastage are discouraged (DWAF, 1999).

3.4 Free Basic Water Policy

On 14 February 2001 a Cabinet decision was taken that all families in South Africa should be entitled to receive 6 kl of water per month free of charge. This is considered to be the basic requirement for any family. The Free Basic Needs Water Policy, as it is now known, states that local government is able to make this provision possible by using part of the Equitable Share, a national grant to all local government structures, as well as by using cross-subsidies from high water users and other local levies and taxes. The Equitable Share is an unconditional grant which was instituted three years ago to make it possible for local government to subsidise the provision of municipal services to the indigent (currently defined as those families with a monthly income of less than R800). Local government does not yet receive the full equitable share grant, but when it does it is supposed to amount to R86 per month per resident indigent family (it is understood that this allowance will be escalated with time).

There is presently a good deal of debate and discussion as to how exactly local government is going to deliver on the Free Basic Services mandate, and what this will cost. In this light this research into the costs of rural water supply schemes is of particular relevance.

Chapter Four

A Review of Four Water Supply Cost Models

Four water supply cost models are reviewed in this chapter. They are:

- the <u>Ninham Shand model</u> developed for DWAF for comparing costs for different levels of service:
- the Mvula Trust's Help Manual for Rural Water Credit;
- the <u>Water Supply Services Model</u> (produced by the Palmer Development Group for the Water Research Commission); and
- the <u>Raftelis Model</u>, which was developed for the pricing of water and wastewater services in the USA.

4.1 The Ninham Shand/DWAF model

The study was conducted through a survey of available systems and strategies for the provision of high levels of service, focusing on the following four broad systems:

- Unregulated storage tanks
- Regulated storage tanks (Equity valve and Trickle feed)
- Prepaid meters
- Conventional metering and billing

After evaluation a summary suitability matrix was developed to help consumers understanding of options available and the costs involved. The costs analysed were in terms of initial capital costs and operation and maintenance. The costs were described as estimates and summarised as follows: staff costs, buildings, administrative systems, operation and maintenance and other disbursements.

The relative results of this model are the following:

- Operational cost recovery is not taking place in many completed RDP schemes and is insufficient in others. The main factor causing this is the lack of will to pay. The result is that in some regions more than 50% of the systems are either partially working or not working.
- Payments of between R17 and R26 per month per household are required to operate yard connections (excluding capital costs, 1998).

4.1.1 Observations

The Ninham Shand/DWAF model classifies projects in terms of the water supply technology employed. The monthly data include capital costs, monthly costs, and subsidies. Calculations of

capital costs and subsidy are well illustrated. The administrative part of the monthly costs is calculated with shared assets between water supply schemes in mind. This may not be applicable in some cases. The monthly O&M cost given by this model for the communal standpipe level of service, for example, is R11.69, but the method used for deriving the O&M cost is not clear. It does however give a thorough analysis of the reticulation costs including the yard connections and the labour cost.

4.2 The Mvula Trust's Help Manual for Rural Water Credit

The Mvula Trust's Help Manual for Rural Water Credit (Venter-Hildebrand, 1999) consists of three components independently applicable. The components are:

- Local Level Demand Analysis
- Technical Options
- Rural Water Supply Financial Model

The first two components, namely the Demand Analysis and Technical Options feed into the financial model. The Help Manual assesses the viability of a prospective loan and its credit risk by using the financial model to calculate the potential annual deficit or profit, taking into account the willingness and capacity of the potential clients to pay. The financial model also gives two different calculation options regarding the information derived from the social surveys. The defaults used in the calculations were reached through surveying 1200 rural households in the four poorest of South Africa's nine provinces.

The financial model has been developed for application in rural villages where new water supply systems are to be provided, or where water supply systems have been provided to the level of a standpipe service and are to be upgraded to provide on-site services. Capital and running costs are included in the model. The running costs are divided into asset replacement and operation and maintenance expenditure. The operation and maintenance costs include pumping costs, water treatment, bulk purchases, maintenance, staff costs, debt write-offs and overheads.

4.2.1 Local Level Demand Analysis

This section describes the estimation of the effective demand for household connections. The method is used to develop a market analysis that contributes to a greater understanding of the willingness and ability of poor rural residents to pay for improved water services. The methodology approach falls within the broad category of contingent valuation² (CV) surveys, with the core of the research being a household CV survey which aims to elicit information from respondents on what they would be willing to pay for the hypothetical situation of improved water services to their households. The rationale of the contingent valuation approach is to estimate consumer demand

A contingent valuation is one which establishes the marginal value, to the users, of improvements to the level of service.

for improved services or conditions that do not have available market prices, such as environmental improvements and public services.

4.2.2 Technical options

In this model four generic groups are considered for the provision of on-site water services whilst ensuring cost recovery. The groups are:

- Yard connections with prepaid meters;
- Yard connections with conventional metering and billing systems;
- Yard connections leading to individual storage tanks with an equity valve or trickle feed system;
- Yard connections leading to individual storage tanks with the supply controlled from a manifold supplying a cluster of homesteads.

4.2.3 Financial model

This model assesses the financial viability of water supply schemes in rural villages when on-site services are provided to all or some households. It is also a tool for deciding on financing options for such schemes. The model can be used by the service provider to determine the tariff that must be charged to maintain viability.

The model calculates the amounts that households will be required to pay to make the service financially viable. These amounts include both payments to the service provider and payments made on private loans. It compares these payments with the amounts that households are willing to pay for water. The total amount that will remain unpaid during the course of a year is then calculated on the assumption that households pay no more than their maximum indicated amounts. The summary indicator of viability is the net cash flow of the scheme for the year. If this is negative, the scheme is not financially viable and must be reconsidered.

For simplicity only public standpipes and on-site services are considered. The model uses Excel worksheets and requires a Windows environment.

4.2.4 Structure of the model

The financial part of the Mvula Trust's Help Manual for Rural Water Credit was adapted from the Water Supply Services Model (the Palmer Model), which is dealt with in section 4.3 of this chapter. The Rural Water Credit model is organised in a logical progression of linked sheets., as described below:

- A description of the area, planning year etc.;
- Demographic and income data;

- Three scenarios for the provision of services, and the capital costs associate with each scenario:
- Financing options for each scenario, giving the mix of grant and loan finance;
- Asset replacement, operating and maintenance expenditure;
- The payment required of households to ensure full cost recovery;
- Willingness to pay and projections of total amounts unpaid;
- A summary sheet of the key input and output variables, as shown in Figure 4.1.

Key outputs are the amounts of finance to be raised per household and the monthly payments required. The indicator of viability is the total expected amount of unpaid bills: where unpaid bills are predicted the investment is not likely to be financially sustainable.

4.2.5 Calculation of asset replacement, operating and maintenance expenditure

Asset replacement costs are entered as a percentage of the construction cost of the infrastructure, the secondary network and the terminals. The total costs per year for the three scenarios are shown in the last three columns of the table.

Pumping costs are recorded by entering the percentage of average daily flow which is to be pumped in each scenario and the cost of diesel and/or electricity in terms of the cost per kl of water pumped (c/kl). The average daily flow for each scenario is displayed at the top of the table. The total annual costs are displayed in the row in which costs are entered.

Treatment costs are recorded by entering a cost per kl of water treated (c/kl). The total annual costs are displayed as above.

Bulk purchase costs are recorded by entering a cost per kl of water bought (c/kl), and the percentage of the total amount purchased that is sold. The total annual costs are displayed as above.

Other expenditure is entered as an amount per annum for each scenario.

Maintenance costs are entered as a percentage of the construction costs of the infrastructure, as in the case of asset replacement.

Staff costs are calculated for each scenario by entering the number of staff employed in each of four categories, at salaries entered by the user. Provision is made for overheads as a percentage of staff costs. A default value of 10 percent of staff costs is provided.

The model then calculates the total cost per annum for each of the scenarios, in rands. It also calculates the cost per kl of water sold and of water used, the latter including physical losses (R/kl).

Table 4.1: Sample Summary of key input and output variables - Help Manual for Rural Water Credit

| | Scenario 1 | Scenario 2 | Scenario 3 |
|--|---------------|---------------|---------------|
| SERVICES | | | |
| % households with on-site connections | 0% | 50% | 100% |
| CAPITAL COSTS | | | |
| Cost of shared infrastructure per household | na | R125 | R75 |
| Cost of terminal per household, full purchase cost | na | R946 | R956 |
| Cost of terminal per household, after contributions | na | R512 | R512 |
| FINANCE | | | |
| Finance for primary infrastructure per h/h | R0 | R0 | R0 |
| Finance for secondary network and terminals per h/h | na | R637 | R587 |
| Upfront payment per household for yard tanks | na | R100 | R160 |
| Private loans for households for yard tanks | na | R537 | R427 |
| OPERATING AND MAINTENANCE COSTS* | | | |
| Monthly O&M cost per household with standpipes only | R2.90 | R5.68 | na |
| Monthly O&M cost for households with yard tanks | na | R7.67 | R7.98 |
| MONTHLY PAYMENTS | | | |
| Total for households using public standpipes | R2.90 | R5.68 | na |
| Payments on private loans per household with yard tanks | na | R38.42 | R30.55 |
| Payment to service provider per household with yard tanks | | R7.67 | R7.98 |
| Total monthly payments per household with yard tanks | | R46.09 | R38.53 |
| UNPAID BILLS (TOTAL, RANDS) | R0 | R0 | (R20,990 |
| | | rate (%) | years |
| Conditions for private loans (interest rate, repayment period) | : | 45% | 2 |

^{*}Note: O&M cost per household calculated as (cost per kl) x (monthly average consumption per household).

Table 4.2: Asset replacement, operating and maintenance expenditure [R per year]

| Bulk and dist | ribution infra | estructure | | | | Scen.1 | Scen.2 | Scen.3 |
|---------------------------------|----------------|------------------------------|----------------|----------------|----------------|--------|--------|--------|
| | | | Ave | rage daily f | low(kl/day): | 72 | 85 | 98 |
| Asset replacement | % Primary | of construction Secondary | Cost [R pa] | Cost [R pa] | Cost [R pa] | | | |
| | | | | 1 | | 5310 | 9289 | 13027 |
| Pumping | % average | daily flow pump | ped | diesel cost | electricity | | | |
| | Scen. 1 | Scen. 2 | Scen. 3 | c/kl | c/kl | 0 | 0 | (|
| Treatment | Cost of che | micals (c/kl) | | | | | | _ |
| | 0.0 | | | | | 0 | 0 | (|
| Bulk purchase | c/kl | % purchased | Scen. 1 | Scen. 2 | Scen. 3 | | | |
| | 0.00 | | | | | 0 | 0 | (|
| Other general expenditure | | | | | | | | |
| Maintenance | % | of construction | cost | | | | | |
| | Primary | Sec net | Terminals | , | | | | |
| | | | | | | 5310 | 9289 | 13027 |
| Staff costs | Staff | Average | Number of s | | gory | | | |
| | category | salary [Rpm] | Scen. 1 | Scen. 2 | Scen. 3 | | | |
| | category 1 | 150 | | | | 0 | 0 | (|
| | category 2 | 500 | 1 | 1 | 1 | 6000 | 6000 | 6000 |
| | category 3 | 1000 | | 1 | 1 | 0 | 12000 | 12000 |
| | category 4 | 2000 | | | | 0 | 0 | (|
| | TOTAL STAFF | | 1 | 2 | 2 | 6000 | 18000 | 18000 |
| Overheads | 8 | s % of staff cos | sts | | | | | |
| | Primary | Secondary | Terminals | | | | | |
| | 0.5 | 10 | 10 | | | 30 | 1800 | 1800 |
| Total | | | | | | 16650 | 38377 | 45855 |
| Cost (R/kl of v | water sold) | | | | | 0.72 | 1.42 | 1.48 |
| Cost (R/kl of v | water used, i | ncluding water | r losses) | | | 0.63 | 1.24 | 1.28 |

4.2.6 Observations

The asset replacement, operation and maintenance expenditure part of this model is the most relevant to this study. Asset replacement costs are calculated as a percentage of the construction costs as indicated in the previous section. This will be used as a guideline in the calculations of the operation and maintenance. The source of the percentage is, however, not given. The percentages can only be taken as indicative. The pumping, treatment and bulk purchase cost calculations are clearly explained. These costs are dependent on the volume of water pumped, treated and purchased. The maintenance costs are calculated as a percentage of the construction cost of the infrastructure, as in the case of asset replacement. The lack of clarification of the calculation of the percentages implies once again that they can only be taken as indicative and as a guideline.

The model is effective as a guideline for planners and financial institutions needing to determine the viability of loans for rural communities wishing to upgrade their infrastructure.

4.3 Water Supply Services Model (Palmer Model)

The next model studied is the Water Supply Services Model (known either as the WSSM or Palmer Model) developed by the Palmer Development Group for the Water Research Commission. This is an investment-tariff model. The purpose of the model is to assist the agencies responsible for water supply in urban areas in the development and evaluation of investment scenarios and tariff policy. The key focus of the model is on the financial viability and sustainability of the water supply service. There are a number of tariff options available.

The model consists of four sections.

- Section 1: This is the interactive section of the model. Essential information is entered and the water supply service options are described. An investment program is designed. The user then sets annual tariff increases to meet the service provider's cash flow requirements. Key outputs on the capital and operating accounts are shown.
- Section 2: The user is requested to enter information to replace default values that are used in the absence of local information. Replacing default values will affect the output in Section 1, which can be finalised only once local information has been entered.
- Section 3: Output information is presented in greater detail, in formats suitable for printing.
- Section 4: This is the 'engine' where most of the calculations are conducted. A user would access this section only to trace the model's calculations, if desired.

4.3.1 Model Description

The purpose of the "Description" input page is to identify the area and model user, set the base year and record details unique to the particular run of the model. The user should input: Local Authority, type, run, scenario and base year.

The current environment:

The information of this page should be as accurate as possible. Where information is not available estimates would be required.

Household and residential consumer units:

The entries needed are total population, number of households on formally serviced sites, number of households in informal settlements, number of households in backyard shacks, formal sites required for households in informal areas, formal sites required for households in backyard shacks, total number of residential consumer units, people per household, residential unit income distribution, and non-residential consumer units.

The future environment:

The entries needed are residential and local economic growth, residential consumer unit income distribution, inflation rate, and responsibility for capital expenditure.

Type of service:

The services entered here are residential services and non-residential services.

Existing service provision:

The data entered here are the residential consumer units and the non-residential consumer units.

Water consumption:

The information entered here is the current consumption, water purchased and purified, water sold and used, water used by service provider, water losses, current capacity of bulk infrastructure, macro-estimates and projects.

Accounts expenditure:

The essential inputs in this page are the amounts spent by the service provider in the base year, in the function categories shown. The allocations are required for administration (including

overheads and sales), bulk (i.e. purchase and/or purification costs), storage (i.e. reservoirs, water towers, etc) and reticulation.

Accounts tariff and income:

Income accrued by the service provider from the sale of water is calculated by the model from the tariff entered as follows: tariff charges (fixed and consumption-based); other income; received income; and cash reserves.

4.3.2 Investment program

The Water Supply Services Model allows the user to make budget provisions to:

- provide for new residential consumer units;
- eliminate the residential backlog and upgrade existing services;
- provide for non-residential consumers;
- plan a metering program for existing residential services.

Investment targets: new residential consumer units:

Information is entered as service types provided. The percentage of new low income consumer units for each type of service are entered.

Investment targets: backlog and upgrading:

In this section data is entered on services to be provided including the backlog and time frames.

Capital requirements:

This is an output screen which shows the capital requirements in nominal and real terms for a five and ten year period.

Setting tariffs:

Setting tariffs to meet cash flow requirements is the final step in the modeling procedure. The tariffs, and the resulting monthly bills, can be used as the final indicator of the affordability of the investment program. The tariffs are set in four sheets that show various fixed and consumption charges.

4.3.3 Net cash flows, non-payment, costs and prices

This is the final output sheet which shows the following: annual and cumulative cash flows (with reference to recurrent income and expenditure only), in both nominal and real terms.

- Non-payment rates
- Budgeted surpluses/deficits
- Debt-service ratios, which show interest and redemption charges on long term loans as a percentage of income billed and income received respectively
- Cost and income information, in c/kl

4.3.4 Observations

The Water Supply Services Model has been developed to enable urban water managers to set tariffs and plan investment programs, in the context of changing and growing cities. It is appropriate for this purpose and is widely used in South Africa.

4.4 Raftelis Model for Water Pricing Structure

The Raftelis model was developed for pricing of water and wastewater services in the USA using well known economic models. The main feature of the model is the fact that the pricing structure is based on the trade-off between revenue requirements and the total cost of services.

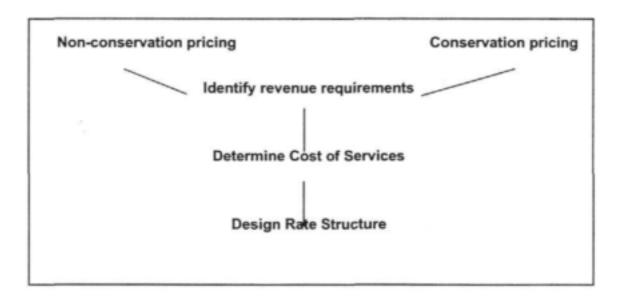


Figure 4.1: Raftelis's Approach to Water Pricing Structure

Raftelis's model breaks down the water pricing into either conservation based or non-conservation based (Figure 4.1). The conservation-based model has an in-built objective of optimising water conservation. On the other hand, the non-conservation based pricing structure optimises sales.

This can be elaborated by considering a rate structure with different blocks of consumption and rates. The motive in the conservation model would then be to charge in a manner that discourages waste. (Raftelis, 1996).

4.4.1 Water Utilities as Enterprises

The Raftelis rate structure is based on the concept of enterprise funds as applied to water utilities. Raftelis has defined enterprise funds as funds established to account for operations that are financed and operated in a manner similar to private business enterprises where the intention of the governing body is that the costs (expenses including depreciation) of providing services to the general public on a sustainable basis be financed or recovered primarily through user charges.

- Where the governing body has decided that periodic determination of revenues earned, expenses incurred and/or net income is appropriate for capital maintenance, public policy, management control, accountability or other purposes.
- ii) As an enterprise fund, water operations are viewed as businesses. Thus, appropriate business principles relating to cost identification, cost effectiveness and financial reporting are addressed at enterprise level.

4.4.2 Characteristics of an Effective Pricing Structure

According to Raftelis, the two issues that ought to be addressed by utility managers are: -

- Which costs should be recovered through user charges; and
- How a pricing structure should be designed to ensure that the issues of sustainability vs. community objectives are adequately addressed.

Raftelis lists the following factors to be considered when designing an appropriate rate structure: -

- Revenue stability;
- ii) Impact on the users i.e. communities;
- iii) Social equity;
- iv) Conservation the community structures have to determine the extent to which they
 would like to ensure optimal use of the available water resource-taking cognisance of the
 availability;
- Legality and litigation potential;

- vi) Simplicity the simpler the rate structure is, the easier it is to implement;
- vii) Rate stability the rate (as opposed to revenue) have to be stable over time. A sense of rate stability helps in continuity of rate payments). Stability in this case does not imply a stagnation of the costs but the stability of the rate structure;
- Implementation implementation issues include collecting data for initial and future modification to consumer billing systems, consumer billing procedures and policies and rates updates;
- ix) Competitiveness the billing structure has to be competitive with those of the adjacent communities.

Several of those pricing criteria can be conflicting. The process of setting the rate structure is thus an exercise in trade-off of the above factors (Raftelis, 1996).

4.4.3 Approach to Establishing User Charges (Tariffs)

Rate (tariff) structures can vary from relatively simple to very complex. The process of establishing the structures involves three steps. These are: -

- Identifying revenue requirements;
- Determining cost of services; and
- Designing a rate structure.

4.4.4 Observations

The Raftelis model is primarily used for larger scale urban water planning. The distinction between conservation and non-conservation price setting is an interesting one. South Africa is a semi-arid country and within a generation may be experiencing chronic water shortages in some regions.

Chapter Five Field Research

5.1 Objectives of field research

As stated in Section 1.1 of this report, this study set about to develop a cost and tariff model applicable to rural water supply in South Africa. In order to ensure that the model is rooted in reality, a number of operational rural projects were surveyed. The intention was to establish just how stand-alone water projects run by rural water committees are sustained, and to reflect that experience in the model.

5.2 Project selection

In order to get the most balanced possible information, it was attempted to survey a wide range of projects. The kinds of variables which are included in the data set are: region; energy source; project size; level of service; implementing agent; and cost-recovery method employed. Thus there are projects from the Northern Province, from KwaZulu-Natal, from the Eastern Cape and from Mpumalanga. There are projects which are wholly gravity fed, others which are supplied using electric powered pumps, and others using diesel powered pumps. There is one, Makopung which uses a combination of diesel and solar energy. Some projects are supplied from boreholes, and others from surface abstractions. There are small projects (e.g. Emayelisweni serves only 630 persons), and large projects (several included here serve more than 5 000). At most of the projects water is supplied through public standpipes, but at others most people have yard connections (e.g. Esidumbini, Nomponjwana).

The key criteria for selection were that a project was completed, had been running for at least six months, and that there was someone who was willing and able to answer the questions contained in the survey. It proved to be no simple task to find projects which met all three of the above criteria.

5.3 Survey methodology

A survey form was drafted by the University of Durban-Westville (see Appendix A). This survey was intended to gather all relevant information about a scheme, and backup questions were included where the more direct questions could not be answered (e.g. there are two different questions which could yield the monthly pumping cost). Surveys of projects were conducted in the field, a field worker going to each project to work though the questions with members of the water committee. Where possible supplementary information was obtained from the engineers who had been involved with the project.

5.4 Limitations with methodology

A number of lessons were learned in collecting and processing the data obtained from the field research. It is no simple matter to obtain accurate and meaningful information from rural water committees. While there were some committees who could give the researchers most of the requested information, most could not. Examples of information which is difficult to obtain in the field are the following:

a) Water usage

Few committees keep records of bulk water usage. The figures for bulk water consumption in most cases had to be inferred from other information obtained e.g. "the committee fills the reservoir twice per week" (but was it empty before it was filled?), and "families are only allowed to draw three 25 litres containers per day" (but do they adhere to this ruling, and what if some take less?). The water usage figures derived from this research are thus approximate at best.

b) Water losses

3

A <u>fundamental</u> aspect of cost determination is the knowledge of water losses. Until recently few of South Africa's towns and cities could say with any confidence what their losses were, and thus it is unsurprising that this information is completely lacking in the field data from these rural water schemes. However, information from a set of six RDP water schemes in KwaZulu-Natal indicates that losses in rural schemes can be very high indeed. In these cases project managers have typically reported losses in the region of 60%, with the range from 20% to 90%³. Without bulk meters, meters at every supply point and training and mentorship it will be impossible to obtain this information from any scheme.

Details of external assistance with pumping costs

In many cases, particularly in the Northern Province, these so-called stand-alone rural water supply schemes are being run with substantial government assistance. In many cases this assistance covers all pumping costs, i.e. diesel/electricity, operator's wages and pump and engine servicing and repair. In some cases this is reflected in the field reports (e.g. at Morapalala in the Northern

These figures do seem high, but it must be remembered that the losses are measured against very low levels of consumption, and that they are incurred over relatively large pipe networks. For example, the authors are familiar with the Emayelisweni Water scheme in KwaZulu-Natal. In this case losses have been measured and calculated since commissioning in July 1998. Measured as a percentage of the water purchased (at R2/kl) from the neighbouring Montebello water scheme, losses have ranged from 15% to 85%. The average figure is 70%. While this figure is unacceptably high, particularly because all the water is paid for at R2.00 per kilolitre, the loss per connection is only 0.2 kl per day, which would equate to only a 20% loss in an urban area where average consumption is typically 1.0 kl per day. Seen another way, the losses in this case amount to less than 30 litres per kilometre of pipe per hour - this is within the level prescribed for background losses in water loss models such as SANFLOW. Nevertheless, there are indications that the water losses being experienced, while they can be explained away and put in a wider context using arguments such as those above, can still be significantly reduced.

Province "two operators are paid by DWAF" - but frustratingly, how much they are paid is not stated). In other cases, one can only speculate about whether it is received or not. For example, the returns for the Phiring and Seokodibeng schemes in the Northern Province indicate no payment for the operators, but there is also no mention of DWAF assistance. One cannot say for certain whether these operators are in fact working voluntarily, or whether the DWAF assistance has just been glossed over.

d) Details of mentorship and support costs

Few, if any, rural water projects operate without some kind of external assistance. Ongoing technical backup, often unremunerated, is often provided by engineers, equipment suppliers and NGOs. In some cases water boards and/or council officials assist with ongoing support and mentorship. It is generally agreed nowadays that a measure of such support and mentorship will be required more or less in perpetuity, and with this in mind the Water Services Act provides for the establishment of Services Support Agents (SSAs). The costs of this support are not apparent to rural water committees, and thus unsurprisingly there is no reflection of these costs in any of the returns.

e) Population figures

The returns generally include a figure for the number of households served, but not the population of the area. Occupancy rates of seven to eight persons per homestead have thus been assumed. The former is more applicable in the rural villages, and the latter in the more dispersed settlements of KwaZulu-Natal.

f) Detail on capital costs

The survey form as drafted requested no breakdown of the capital cost of the projects. It is also unlikely that the average water committee, several years after the completion of the scheme, would be willing to go to the trouble of finding the breakdown of the capital costs. The project engineers can usually provide this information, unless the individual concerned is no longer active in the area. For the purpose of asset replacement cost estimation, the most important distinction is between the electrical/mechanical costs and the civil costs. The former are in general relatively rapid wearing items which cannot be expected to provide more than ten years' service. The latter (principally pipes and reservoirs) are long-lasting items which should last for forty years or more.

g) Pumping heads

In some cases those surveyed were unable to say what the pumping head was. Estimates of heads can be made if the pumping rates and motor or engine size is known.

h) Unpaid Debts

In some cases, e.g. Nhlungwane in KwaZulu-Natal, the committee reported that they did have outstanding accounts. In other cases, however, such as one project on the Natal South Coast, the committee did not report that they owed their bulk water supplier over R150 000. Most of the schemes were using independent sources, however, and would thus not easily get themselves into such deep debt.

5.5 Findings

The surveys are too long to be included in this report. Nevertheless the key data for each of the projects has been reproduced in Appendix C and summarized in Tables 5.1, 5.2, and 5.3 below.

A number of interesting findings can be drawn from the field data.

5.5.1 Water Consumption

Although water consumption can in most cases only be estimated from the data gathered, the indications are that the median water consumption in rural areas is low, less than 4 kl per month. Schemes with metered yard taps recorded relatively low consumptions, but those with unmetered yard taps recorded higher consumptions. For example, the average consumption at Emayelisweni/Montebello was just 3.12 kl/hh/month, or 8.7 litres per person per day (but this is based on the assumption that each yard tap is shared by 12 people - which may be an overestimate). The only schemes which have consumption figures above 25 litres per person per day, or 6 kl/family/month, are the Fairview and Nomponjwana schemes in KwaZulu-Natal, both of which have unmetered yard connections. The estimated consumption figures for these two schemes are 16.07 and 8.14 kl/hh/month respectively.

5.5.2 Cost per family per month

The budgeted costs per family per month are low. The mean figures are R9.15, R5.49 and R3.87 for KwaZulu-Natal, the Northern Province and the Eastern Cape respectively. However the spread of figures is wide - the standard deviations of the mean in the provinces are R8.62, R6.81 and R2.80 respectively [the Standard Deviation gives an indication of the spread of the bulk of the data above and below the mean]. In other words the majority of projects are running on budgets of less than R15 per family per month, and some much less. The highest recorded budget cost per household per month is R33.30 for Emayeliweni/Montebello in KwaZulu-Natal, but this figure is misleading because DWAF paid a number of large pump repair bills during the period under review. Similarly the figure for Claremont in the Northern Province is high, but DWAF is paying most of the cost (R1900/month operator's wages).

Caution needs to be exercised in drawing any conclusions from the data, as some projects were not able to declare the details of the operational subsidies which they are receiving. For example, in the Northern Province it is common for DWAF to pay the cost of pump servicing, fuel and operators wages. However, although it is common, it is also not standard on all projects, so it is hard to know how to adjust for this hidden subsidy.

5.5.3 Cost per kilolitre

The mean budget cost per kilolitre is R4.96 in KwaZulu-Natal, with a standard deviation R3.58. In the Northern Province the mean is R1.76, with a standard deviation R1.36. In the Eastern Cape the figure is R1.61, with a standard deviation R0.90. The higher costs in KwaZulu-Natal are indicative of the greater use of water meters or water vendors in that province.

5.5.4 Water tariffs

Water tariffing practice varies from scheme to scheme. The flat-rate monthly payment system is the most popular cost-recovery option, employed by 31 of the 38 projects surveyed. Of the seven with water metering, six were in KwaZulu-Natal, and one was in the Eastern Cape.

The mean flat rate was R9.40/hh/month, with a standard deviation of R5.89. In other words, the typical range of monthly charges on community water projects with flat rate charges is between R4 and R16. In KwaZulu-Natal the mean flat rate charge was R13.40, with a standard deviation of R8.50, whereas in the other provinces it was lower (Northern Province mean R8.19 with std. dev. R2.40, Eastern Cape mean R5.30, std. dev. R2.99).

On the seven projects where water was being charged for at a metered rate, the mean rate was R5.70/kl, with a standard deviation of R2.36/kl.

5.5.5 Bad debt levels

The levels of bad debt are in general representative of projects which are operating. The typical levels of payment are 70%, i.e. some 30% of the people served are defaulting.

Some anomalies are evident in the tables. For example there are four schemes (KwaNyuswa, Mission and Mvunyane in KZN and Claremont in the Northern Province) which have reported receipts over the six month survey period in excess of budgeted income. There are two possible explanations: either the period included receipts from people who were paying off several months at once; or the receipts recorded do not distinguish between payments for water and connection fees. The latter is the more probable explanation.

5.5.6 Absence of savings

The most notable thing about saving for asset replacement, is that it is not happening. This is to be expected in poor rural communities, where life is sustained on a hand to mouth basis. The expenditure figures obtained thus do not adequately reflect the long term operation and maintenance costs, and as such do not represent the real costs of operating these schemes.

However, there is concern that when a major repair cost does present, e.g. if the diesel engine needs to be reconditioned, or the electric motor is damaged by lightning, then there are no savings available to meet the cost.

5.5.7 Schemes operating in deficit

Several of the schemes were operating in the red (the more notable examples being Dicks, Emayelisweni, Ngolokodo and Ezinqeni in KZN; and Claremont, Seokodibeng, Mankotsana and Mars in the Northern Province). These projects are still operating either because they are not paying their accounts or their staff and getting away with it (e.g. Ezinqeni), or because they receive operational assistance from DWAF.

5.5.8 Cost effectiveness of gravity schemes

The 38 projects surveyed included three gravity schemes where no pumping was required, two in KwaZulu-Natal (Vukanathi and Zamimpilo) and one in the Eastern Cape (Tsita). A distinctive feature of these projects are their very low operating budgets. The budgets for the three projects are: Tsita R1.37/hh/month; Vukanathi R0.63/hh/month; and Zamimpilo R1.09/hh/month. The corresponding tariffs are R3/hh/month, R7 and R10. At Vukanathi it appears that no-one is paying the tariff, but as this is a gravity scheme it is at this stage still functioning.

5.5.9 Cost effectiveness of community management

It is notable that the typical wages paid to staff are very modest. Wages of R200 to R500 per month are typical. Although the work is part-time, there is clearly a spirit of community service at work in these projects. These low staff costs are also a reflection of the cost effectiveness of community level management, compared with management from the nearest urban centre.

Also notable is the very negligible amounts being spent on transport. Most committees are not spending more than R200 per month on transport, although the median expenditure is much less than that. This is again a reflection of the cost-efficiency of community level management.

Table 5.1 Summary of field data and cost calculations from 16 community water supplies in KwaZulu-Natal, South Africa

| Scheme Name | Source | Energy Type | Number of House- holds | Estimated Bulk Volume per month | Estimated Water used per hild per month (after 40% losses) | Monthly Operation budget | Monthly Maint- enance budget | Monthly Staff budget | Total Monthly Budget | Budget Cost per House hold per month | Unit cost/kl supp- lied | Current Tariff per hh/ month or /kl | Average Receipts last six months | % Paymen t as Receipts / Budget Income |
|----------------|-----------|----------------|---------------------------------|---|--|--------------------------------|---------------------------------------|----------------------------|----------------------------|--|----------------------------------|---|---|--|
| | | | | kl | | (R) | (R) | (R) | (R) | (R) | (R/kl) | | (R) | % |
| Dicks | Borehole | Eskom | 800 | 1,920 | 1.44 | 500 | 0 | 1,500 | 2,000 | 2.50 | 1.74 | R10/hh | 522 | 7 |
| Emayelisweni | River | Eskom | 190 | 1,799 | 3.12 | 1,510 | 4,109 | 708 | 6,327 | 33.30 | 10.66 | R4/kI | 1,300 | 61 |
| Esidumbini | Dam | Eskom | 400 | 4,200 | 6.30 | 3,893 | 1,000 | 1,000 | 5,893 | 14.73 | 2.34 | R30/hh | 6,459 | 50 |
| Ezinqeni | Lake | Eskom | 196 | 760 | 2.33 | 800 | 60 | 600 | 1,460 | 7.45 | 3.20 | R10/hh | 142 | 7 |
| Fairview | River | Eskom | 224 | 6,000 | 16.07 | 1,350 | 300 | 600 | 2,250 | 10.04 | 0.63 | R20/hh | 7 | ? |
| KwaMbotho | River | Eskom | 508 | 1,219 | 1.44 | 1,000 | 470 | 1,680 | 3,150 | 6.20 | 4.31 | R8/kI | 5,839 | 100 |
| KwaNyuswa | River | Eskom | 299 | 456 | 0.92 | 820 | 720 | 1,200 | 2,740 | 9.16 | 10.01 | R8/kI | 3,372 | 154 |
| Mission | Borehole | Diesel | 107 | 192 | 1.08 | 140 | 70 | 600 | 810 | 7.57 | 7.03 | R5/kl | 770 | 134 |
| Mvunyane | Boreholes | Eskom | 528 | 1,050 | 1.19 | 500 | 171 | 200 | 871 | 1.65 | 1.38 | R2/kl | 1,409 | 112 |
| Ngolokodo | Borehole | Eskom | 563 | 910 | 0.97 | 1,500 | 320 | 1,680 | 3,500 | 6.22 | 8.41 | R5/hh | 2,150 | 76 |
| Nhlungwane | Borehole | Diesel | 204 | 459 | 1.35 | 316 | 450 | 400 | 1,166 | 5.72 | 4.23 | R7/hh | 1,437 | 101 |
| Nomponjwana | River | Eskom | 764 | 10,367 | 8.14 | 3,700 | 3,480 | 6,750 | 13,930 | 18.23 | 2.24 | R25/hh | 12,243 | 64 |
| South Coast 1 | Bulk | n/a | 1500 | 7,000 | 1.87 | 22,000 | 916 | 6,000 | 28,916 | 19.28 | 10.33 | R8/kl | 18,870 | 100 |
| Thuthukani | Borehole | Eskom | 306 | 7 | ? | 400 | 416 | 0 | 816 | 2.67 | ? | R10/hh | 368 | 12 |
| Vukanathi | Stream | Gravity | 70 | 7 | ? | 44 | 0 | 0 | 44 | 0.63 | ? | R7/hh | 0 | 0 |
| Zamimpilo | Stream | Gravity | 46 | ? | ? | 50 | 0 | 0 | 50 | 1.09 | ? | R10/hh | 380 | 83 |
| MEAN VALUE | | | | | 3.56 | | | | | 9.15 | 4.96 | | | 71 |
| STD. DEVIATIO | N | | | | 4.37 | | | | | 8.62 | 3.58 | | | 47 |

Note: Actual recorded losses at Emayelisweni/Montebello have been used. In absence of information a default of 40% is used in all other cases., except South Coast 1 which has estimated 60% losses (Lima, 2000). Nomponjwana and Fairview both have unmetered yard connections..

Table 5.2 Summary of field data and cost calculations from 16 community water supplies in the Northern Province, South Africa

| Scheme Name | Source | Energy Type | Number of House- holds | Estimated Bulk Volume per month | Estimated Water used per hhid per month (after 40% losses) | Monthly Operation budget | Monthly Maint- enance budget | Monthly Staff budget | Total Monthly Budget | Budget Cost per House hold per month | Unit cost/kl supp- lied | Current Tariff per hh/ month or /kl | Average Receipts last six months | % Paymen t as Receipts / Budget Income |
|----------------------|----------|----------------|---------------------------------|---|--|--------------------------------|---------------------------------------|----------------------------|----------------------------|--|----------------------------------|---|---|--|
| | | | | kl | | (R) | (R) | (R) | (R) | (R) | (R/kl) | | (R) | % |
| Bremodupo | Borehole | Diesel | 438 | 1,270 | 1.74 | 450 | 174 | 1,200 | 1,824 | 4.16 | 2.39 | R10/hh | 1,333 | 30 |
| Claremont | Borehole | Diesel | 95 | 1,075 | 6.79 | 500 | 118 | 2,220 | 2,838 | 29.87 | 4.40 | R10/hh | 1,094 | 115 |
| Fairlie Halt | Borehole | Diesel | 380 | 1,555 | 2.46 | 250 | 163 | 400 | 813 | 2.14 | 0.87 | R5/hh | 725 | 38 |
| Leokaneng | Borehole | Diesel | 332 | 2,560 | 4.63 | 450 | 84 | 220 | 754 | 2.27 | 0.49 | R5/hh | 475 | 29 |
| Magubuku | Borehole | Diesel | 450 | 864 | 1.15 | 258 | 366 | 1,320 | 1,944 | 4.32 | 3.75 | R10/hh | 3,825- | 85 |
| Makweya | Borehole | Diesel | 362 | 960 | 1.59 | 520 | 195 | 520 | 1,235 | 3.41 | 2.14 | R8/hh | 2,106 | 73 |
| Mankotsana | Borehole | Eskom | 1875 | 4,561 | 1.46 | 600 | 130 | 1,815 | 2,545 | 1.36 | 0.93 | R5/hh | 3,310 | 35 |
| Mars | Borehole | Diesel | 315 | 921 | 1.75 | 498 | 255 | 420 | 1,173 | 3.72 | 2.12 | R10/hh | 453 | 14 |
| Maupye | Borehole | Diesel | 171 | 400 | 1.40 | 500 | 192 | 320 | 1,012 | 5.92 | 4.22 | R10/hh | 902 | 53 |
| Morapalala | Borehole | Eskom | 330 | 4,800 | 8.73 | | 300 | DWAF | 300 | 0.91 | 0.10 | R5/hh | 895 | 54 |
| Phiring | Borehole | Eskom | 361 | 2,702 | 4.49 | 1,100 | 416 | | 1,516 | 4.20 | 0.94 | R5/hh | 1,290 | 71 |
| Sekuruwe | Borehole | Diesel | 218 | 930 | 2.56 | 550 | 287 | 150 | 987 | 4.53 | 1.77 | R7/hh | 1,118 | 73 |
| Seokodibeng | Borehole | Diesel | 572 | 4,000 | 4.20 | 900 | 70 | | 970 | 1.70 | 0.40 | R10/hh | 722 | 13 |
| Sterkspruit No. 2 | Borehole | Eskom | 226 | 2,720 | 7.22 | 850 | 302 | 400 | 1,552 | 6.87 | 0.95 | R10/hh | 916 | 41 |
| Vhutalu | Borehole | Eskom | 120 | 900 | 4.50 | 520 | 53 | 450 | 1,023 | 8.53 | 1.89 | R10/hh | 1,143 | 95 |
| Wismar | Borehole | Diesel | 300 | 2,510 | 5.02 | 450 | 233 | 500 | 1,183 | 3.94 | 0.79 | R11/hh | 1,856 | 56 |
| MEAN VALUES | | | | | 3.73 | | | | | 5.49 | 1.76 | | | 55 |
| STD. DEVIATION | 1 | | | | 2.35 | | | | | 6.81 | 1.36 | | | 29 |

Table 5.3 Summary of field data and cost calculations from 6 community water supplies in the Eastern Cape and Mpumalanga, South Africa

| Scheme Name | Source | Energy Type | Number of House- holds | Estimated Bulk Volume per month | Estimated Water used per hhld per month (after 40% losses) | Monthly Operation budget | Monthly Maint- enance budget | Monthly Staff budget | Total Monthly Budget | Budget Cost per House hold per month | Unit cost/kl supp- lied | Current Tariff per hh/ month or /kl | Average Receipts last six months | Paymen t as Receipts / Budget Income |
|--------------------------|----------|----------------|---------------------------------|---|--|--------------------------------|---------------------------------------|----------------------------|----------------------------|--|----------------------------------|---|---|--|
| | | | | kl | | (R) | (R) | (R) | (R) | (R) | (R/kI) | | (R) | % |
| Masakala | Borehole | Diesel | 850 | 1,160 | 0.82 | 472 | 180 | 1,500 | 2,152 | 2.53 | 3.09 | R5/kl | 2,083 | 60 |
| Ngqele | Borehole | Eskom | 500 | 3,100 | 3.72 | 800 | 200 | 0 | 1,000 | 2.00 | 0.54 | R2.50/hh | 1,000 | 80 |
| Percy | Borehole | Diesel | 416 | 1,080 | 1.56 | 300 | 210 | 500 | 1,010 | 2.43 | 1.56 | R5/hh | 1,040 | 50 |
| Tsita | River | Gravity | 1900 | 5,070 | 1.60 | 0 | 40 | 2,572 | 2,612 | 1.37 | 0.86 | R3/hh | 2,644 | 46 |
| Umtebe | Spring | Diesel | 81 | 600 | 4.44 | 320 | 60 | 200 | 580 | 7.16 | 1.61 | R6hh | 486 | 95 |
| Makopung - Mpumalanga | Borehole | Solar/Diesa | 175 | 1,120 | 3.84 | 500 | 132 | 720 | 1,352 | 7.73 | 2.01 | R10/hh | 1,166 | 67 |
| MEAN VALUE | s | | | | 2.66 | | | | | 3.87 | 1.61 | | 1,403 | 66 |
| STD. DEVIATI | ON | | | | 1.51 | | | | | 2.80 | 0.90 | | 799 | 19 |

Chapter Six

Model Development

The WRC Cost and Tariff Model for Rural Water Supplies has been developed as a set of linked spreadsheets using Microsoft Excel '97 software. Excel is widely used, and moreover Excel spreadsheets can be read by Quattro users, Quattro being probably the second most widely used spreadsheet package. The model should thus be readily accessible to users practically anywhere.

6.1 Model features

The model has been written with a number of desired features in mind:

- i.e it must be possible to use the model either at a simple level, or at a more complex level i.e it must be possible to use the model even if accuracy is compromised, even if only the bare details regarding a scheme are known, or if the user does not have the time to fill in all the information which is known. However, the user that has the detailed information and the time to run the model at a more sophisticated and thorough level should be able to do so.
- ii) The model must separate costs into a logical framework, i.e. capital costs, asset replacement costs, overhead costs, production costs, repair and maintenance costs, support and mentorship costs.
- No costs must be hidden. Any subsidies applicable must only be taken into account once all real costs have been determined. (One of the uses of the model is for the comparison of the economics of different options - this can obviously not be done if any costs are hidden).
- All data must be entered only once in the model, to avoid situations where a change in the value of a key variable at one point is not reflected at another point. For example, the numbers of the different types of connections are all specified on model page three "Demand Assessment". The next time this data is reflected is on page eleven, "Tariff Calculation", where it is linked to page three and thus generates automatically.
- v) It must be possible to model any simultaneous combination of Levels of Service. While a scheme may primarily supply water via community standpipes, for example, it may also include a large number of yard connections. The Mseleni Water Scheme in northern KwaZulu-Natal, for example, has a combination of unmetered public standpipes, metered yard connections and unmetered yard connections. Each of these service levels has its own water demand characteristic, which needs to be separately reflected.

- vi) Where possible the model layout, structure and terminology should reflect the Department of Water Affairs and Forestry's Operation and Maintenance reporting system for rural water schemes. During the last two years a fairly comprehensive O&M reporting system has been developed by DWAF and Umgeni Water specifically for rural water schemes. This reporting system uses certain terminology and cost codes, all of which have been reflected in the relevant pages of this model.
- vii) The model must be able to process simultaneously various water demand scenarios. This is important because cost per kilolitre is generally very sensitive to demand, mainly because the fixed costs (capital costs, asset replacement, rental charges and salaries) tend to be the dominant factor in the pricing of water, particularly rural water.
- viii) The levels of water loss and bad debt must be explicit. Water losses and bad debt can jointly affect the cost of water by an order of magnitude. It is thus critical that these aspects of pricing are clearly dealt with at the relevant points in the model (losses are specified on page 3, Demand Assessment, while bad debt is specified on Page 10, Tariff Calculation).
- The model must distinguish between total population and population served. It is misleading to base tariff calculations on the total population in a project area. The model provides data fields both for total population (which is used merely for background information, and not in calculations), and for numbers of households actually served at each service level (which are the figures used in later calculations). For example, if the first phase of a water scheme includes only the main line with a number of public standpipes, and, say, two thirds of the population reside more than a kilometre from those standpipes, then one might be supplying and selling water to only one third of the population. The distance people will travel to collect water from a tap and the volume they will collect from the tap are dependent on the alternative supply options available to them (e.g. rainwater tanks and springs).
- x) Loan and grant finance must be separately specified. Note that, in keeping with the principle of no costs being hidden, the model does not assume that grant finance is free. The user is asked to specify the opportunity cost of the grant finance (in terms of an interest rate), and this opportunity cost is later allocated to the source of the grant (typically national or local government, or even international government aid funding).
- xi) The model must reflect the effect of inflation on asset replacement costs. The model has data fields for the cost of the different components of the scheme, as well as the commissioning date of the schemes major components and the applicable inflation rate. The escalated replacement cost of the assets can thus be calculated at any later date, and this is used in calculating the scheme's full real costs for that date.

- The model must allow for cost sharing between Water Services Authorities, Water Service Providers, National Government and other stakeholders. While no costs are hidden, the user is primarily interested in calculating the costs and tariffs relevant to the Water Service Provider. The Monthly Cost Summary sheet allows costs to be distributed according to which body (WSA, WSP, National Government or Other) is to budget for that expense. In this way the final screen, Tariff Calculation, deals only with the costs allocated to the Water Service Provider.
- xiii) In setting tariffs, users must be able to use a combination of fixed charges and volumetric charges (with rising blocks, if required) for any level of service. The user must be able to specify different tariffs and charges for each different level of service.
- The model must reflect costs in terms of both volume of water supplied (R/kl) and in terms of households served (R/hh). The volume of water supplied here must exclude losses. The cost per kilolitre is important indicator of the effectiveness of a water supply scheme. For example, if one scheme supplies on average five kilolitres per family per month at R4/kl, for a total of R20/family/month, it is far more cost-effective than another scheme which supplies two kilolitres per family per month at a cost of R10/kl (which would also have a monthly cost per household of R20). The monthly cost per household served is an important indicator of affordability. It is generally accepted that 3 to 5% of monthly income is the amount people are prepared to spend on a reliable and adequate water supply service.

The WRC Cost and Tariff Model for Rural Water Supply Schemes does not calculate cash flow. It determines the costs and revenue (and thus profit or loss) for a particular status of the scheme at a point in time. However, the model does contain three scenario options (low, medium and high) which can be used to simulate changes in levels of service and consumption, indirectly cash flow, over a period of time. Note that this latter method of determining cash flow is based on the assumption that no extra capital costs are incurred - i.e. customers pay for their own connections, and the scheme already has the capacity to meet the higher demand. If future scenarios require additional capital investment, then the cash flow must be determined indirectly by running additional simulations which include the revised capital costs.

6.2 Model layout

Figure 6.1 shows the flowchart of the ten spreadsheets of the model.

Three colours are used to denote input and output fields in the spreadsheets. Blocks coloured dark blue denote essential information, which must be entered by the user if the model is to produce any output. Blocks coloured light blue denote useful information which can nevertheless be omitted at the user's discretion. Yellow blocks denote values which are generated though the working of the model.

All cells with formulae and text are write protected, to protect the user from inadvertently corrupting the model. However, this write protection can be bypassed by simply saving the model under a new name.

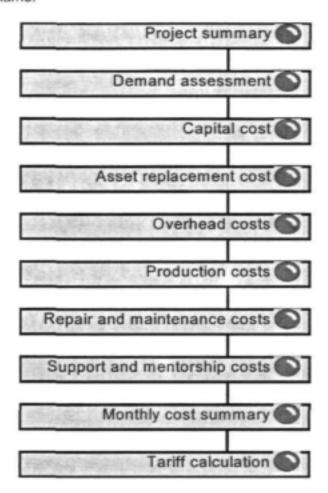


Figure 6.1 Flow chart of the WRC Rural Water Supply Cost and Tariff Model

6.2.1 Model flow chart

The first sheet in the model is simply the layout of the model, as shown in Figure 6.1. Clicking the left mouse button on any of the blue buttons places the user immediately on the associated spreadsheet. Users can also navigate around the model by clicking on the page tabs at the bottom of the screen.

6.2.2 Project summary

This is used to capture the key descriptive information regarding the model.

Essential Data:

On the Project Summary sheet, the essential data is as follows:

- scheme name
- scheme reference number (e.g. DWAF Ref. Number or Mvula Trust Ref. Number or District Council Ref. Number)
- province
- population of project area
- number of households in project area
- the number of years since project commissioning (used to index capital costs)
- the water source
- the energy source (if applicable)
- the treatment type, and
- a run or analysis number.

The project name and the analysis number are reproduced in the header of all printouts from the model.

Strictly speaking most of the fields listed as essential on this first sheet are not actually required for any calculations in the model. The purpose for highlighting them thus is to ensure that the resulting model printout is not unreferenced.

Discretionary Data

In addition to the above, the following information can be added:

- the number of institutions served (e.g. schools and clinics)
- the number of commercial premises
- the project area in square kilometres
- the name of the person carrying out the analysis
- the date of the analysis
- the name of the person who has supplied the data required for the model
- the date of collection of the data
- the names and contact details of important roleplayers (Funding Agent, Implementing Agent, Project Engineer, Water Services Authority, Water Service Provider).

An output from this spreadsheet, which is used elsewhere in the model, is the average number of people per household.

6.2.3 Demand assessment

The user is given three Scenarios to complete, each with a different configuration of service levels and/or consumption.

Essential Data:

On the Demand Assessment sheet, the essential data is as follows:

- the numbers of "connections" for each service level
- the % transmission losses budgeted for (calculated as a percentage of consumption, as opposed to a percentage of bulk water pumped or purchased)

The term "connection" is used loosely, as one of the service level categories is for wells and handpumps. Default values are given for low, medium and high levels of consumption, and these values are also contained in a note (which can still be referred to after the defaults have been altered). Table 6.1 below shows the default demand values.

Discretionary Data

In addition to the above, the following information can be added:

- planned consumption per person per day for each level of service and demand type;
- the average number of households served by each public standpipe, handpump or well.

Outputs from this screen are:

- the number of people served (which may be different to the project population) by each service level in each of three scenarios;
- the total number of people served in each demand scenario;
- the total consumption per connection type and demand scenario per month; and
- the volume of bulk water required for each demand scenario.

Table 6.1 Default consumption values, litres per person per day

| Service Level | Low Demand | Medium Demand | High Demand |
|----------------------------|------------|---------------|-------------|
| Public Handpump/well | 5 | 10 | 20 |
| Private handpump/well | 20 | 30 | 40 |
| Metered public standpipe | 2 | 7 | 12 |
| Unmetered public standpipe | 6 | 21 | 36 |
| Metered Yard Tank | 7 | 15 | 30 |
| Unmetered Yard Tank | 20 | 40 | 60 |
| Metered Yard Tap | 7 | 15 | 30 |
| Unmetered Yard Tap | 20 | 40 | 60 |
| Metered House Connection | 30 | 60 | 120 |
| Unmetered House Connection | 60 | 120 | 240 |

6.2.4 Capital cost

Essential Data:

On the <u>Capital Cost</u> sheet, there is no essential data. The user has to choose whether to complete the model's Table 4.1 or Table 4.2. The former is for users who either do not have time or the necessary information to fill in the latter, which is more detailed.

Discretionary Data

The model's Table 4.1 is completed if the user wished to summarize the project's capital cost in just two lines: the total of the mechanical and electrical works, and the total of the civil works. These capital costs must include all professional fees, but can exclude non-capital items such as planning and training.

Table 4.2 is a more detailed option for showing the capital costs of the scheme. This table has the same divisions as Model Table 4.1 (i.e. mechanical/electrical and civil), but each of the divisions is broken down into a number of component parts. The mechanical/electrical is broken down into pump installation(s), electrical controls and other. The civil costs are subdivided into bulk system, distribution system, meters, connections and miscellaneous. Each of these subdivisions is in turn subdivided into its core components. For example, the bulk system is divided into water collection structures (spring protection, borehole, weir, dam), pumphouse, water treatment facility and bulk main. In Model Table 4.2 items can either be priced using lump sums, or using quantities and unit costs.

The model is able to distinguish between Tables 4.1 and 4.2 and only uses the data from 4.1 if 4.2 is not completed.

The user then has fields to show where the finance is to come from/has come from to build the project. There are fields for both loan and grant finance. In the case of loan finance the user is prompted for a loan repayment period and an interest rate. In the case of the grant finance, not forgetting the objective that no subsidies should be hidden, the user is prompted for the real annual rate of return that the grant finance might have earned if not used for this purpose.

The output from this spreadsheet is the monthly cost of the capital required to build the project.

6.2.5 Asset replacement cost

The fifth spreadsheet is used to calculate the budget for asset replacement. This is the cost which is typically absent from budgets on projects run on a hand to mouth basis by poor rural communities. After commissioning one can expect to be able to operate a project for several years without any major component failure. However, any part of the scheme does have only a

finite usefulness. For example, a diesel engine which is faithfully maintained will still need to be replaced after 12 000 hours of service (Department of Agriculture, 2000) - if it is used for eight hours per day, every day, then it will not last much more than four years. A pipeline made of corrosion resistant materials will last much longer. It may in fact last until the demand of the scheme exceeds its capacity, at which time it loses its value due to obsolescence.

The user is required to enter the inflation rate, the commissioning date of each component and the expected useful life of each component.

The asset replacement cost of each component is calculated by depreciating its current replacement value over its expected useful life. Table 6.2 gives a set of default life expectancies. (Umgeni Water, 1997).

Table 6.2 Life expectancy of various scheme components (Umgeni Water, 1997)

| Description | Useful Life Expectancy (Years) |
|--|--------------------------------|
| Mechanical/electrical costs | |
| Pump installation | |
| Electric controls | |
| Other | |
| Civil Works | |
| Borehole | |
| Dam | |
| Pumphouse | |
| Water Treatment Plant (excludes elec/mech) | |
| Bulk Main | |
| Primary Reservoirs | |
| Secondary Reservoirs | |
| Primary Reticulation | |
| Secondary Reticulation | |
| Bulk Meters | |
| Consumer Meters | |
| Public Tapstands | |
| Yard Tanks | |
| Yard Taps | |
| Connections | |
| Buildings | |

NOTE: It is recommended that the economic life of reservoirs and reticulation in the table above be extended to 40 years if population growth is low and the construction materials used are not prone to degradation. Where the water is known to be liable to corrode certain scheme components (e.g. fibre-cement or steel pipes), their life expectancies should be adjusted accordingly.

The output from this spreadsheet is the monthly value (in current terms) of asset replacement for the whole project. If this amount of money were invested on a monthly basis, with the value of monthly contributions linked to inflation, then at the end of the project's useful life, there would be adequate funds invested to completely rebuild the project.

In reality the asset replacement fund, assuming there is one, will be tapped from time to time to upgrade the scheme on a more continuous basis. For example, after ten years the pumps, motors and controls might be replaced and upgraded. After another five years the treatment plant might be upsized. After another five years the reservoirs might be doubled in size, and so on.

One of the higher budget items should be the servicing of meters, parts of which may need to be replaced as often as every five years.

6.2.6 Overhead costs

There is no essential data on the overhead cost spreadsheet. This is the first spreadsheet to refer to cost codes which are included in the Operations and Monitoring reporting system which has been developed for DWAF projects.

Monthly overhead costs are entered according to the following breakdown (with the user selecting the relevant lines to complete): office staff wages; field staff wages; water committee allowances/expenses; security guard's wages; bank charges, telephone, taxi fares; stationery and computer consumables; water office electricity costs; insurance premiums and licence costs; vehicle costs; Eskom basic costs and line rentals, inclusive of VAT; cost of subsidising new public or private connections (if applicable); and cost of pre-payment tokens.

The output from this page is the expected monthly overhead cost.

6.2.7 Production costs

There is no essential data on the production cost spreadsheet. As with the previous page, the same cost structure and codes are used as are found on the DWAF O&M reporting sheet. The user enters monthly production costs under four headings: bulk water buy-in cost (if applicable); treatment cost; pumping cost (energy); and labour cost. Each of these costs is entered in terms of costs per kilolitre produced. If the costs are independent of volume produced it might be more appropriate to enter them under one of the headings used for overhead costs. The most significant items under production cost are either bulk purchase or pumping. The user is given the option of calculating the probable pumping costs using the energy demand table provided. This table has fields for pump type, flow rate, % of total water requirement pumped, pumping head, pump efficiency, Eskom tariffs and diesel costs. Five separate pumping stages can be accommodated in this table.

The output from this page is the expected monthly production cost.

6.2.8 Repair and maintenance costs

After overhead costs and production costs, this is the third of the cost sheets which uses the cost structure and codes also found in DWAF's O&M reporting format. The users enters monthly costs under the headings local labour, materials, outsourced labour, plant, transport, automatic dispensing units and other.

A maintenance cost table is included for the user with time to break the various costs down according to the various components of the scheme. This table should ideally be used in order to come up with the monthly breakdown into the various cost codes.

Note that maintenance and asset replacement must not be confused. Maintenance includes routine activities such as cleaning reservoirs, painting pipe markers, fixing leaks, and servicing engines. It is relatively inexpensive. Asset replacement, which is handled on the fifth spreadsheet, is used to describe the upgrading, extension and replacement of components, and it is relatively expensive.

The output from this page is the expected monthly repair and maintenance cost.

6.2.9 Support and mentorship costs

In terms of the Water Services Act a Water Services Authority has a statutory responsibility to ensure that all the water service providers under its jurisdiction do perform their duties adequately. This means that the water service providers must provide a reliable, affordable supply of good quality to all who are prepared to pay for it, as well as a lifeline supply to the indigent for whom government maintenance grants are available.

Water Services Authorities have to supervise, support and stimulate water services providers in order for them to meet their obligations. This management costs money, whether the WSA uses its own staff or contracts in the services of a Services Support Agent, and it must thus be budgeted for.

The ninth spreadsheet uses a cost structure, again derived from the DWAF O&M reporting format, to assist the user to work out the monthly cost of support and mentorship. The costs are divided into bulk supply cost, environmental management, facilitation, implementing agent's costs (this should only be for the period between commissioning and transfer to the WSA), project management, water quality monitoring, reticulation and training. Alongside each of these headings are columns for time, transport and materials.

The output from this page is the expected monthly support and mentorship cost.

6.2.10 Monthly cost summary

If the user has entered all data realistically, the tenth spreadsheet will give the monthly cost of the scheme, with no costs hidden. The breakdown comes through from the preceding sheets, namely capital costs, asset replacement costs, overhead costs, production costs, repair and maintenance costs, and support and mentorship costs. The production costs are given for each of the three demand scenarios.

The total of all the costs is then given in three ways for each demand scenario: total costs, costs/kl and average cost/household.

The user must now decide who is to bear the responsibility for all these costs. Four columns are provided for this purpose, headed Water Service Provider, Water Services Authority, National Government and Other.

Typically (at least under our current funding conditions), the national government is funding the full capital costs of rural water supply systems up to the so-called RDP level of service (25 litres per person per day delivered to within 200 metres). This means that in most cases the monthly capital cost will be covered entirely by national government. However, in the case where the water service provider has taken a loan to finance an upgrade to the scheme, the appropriate portion of the monthly capital cost should be entered under the *Water Service Provider* column.

Support and mentorship should typically be budgeted for in the Water Services Authority column, as this is the WSA's primary role.

Ideally the costs of asset replacement should be recovered by the water service provider through the tariff. However the poor economics of rural water supply (low volumes, large distances, long down-times, predominantly poor customers) mean that at best a rural WSP can only hope to budget for essential asset replacement (mainly mechanical and electrical failure). Asset replacement costs should thus be distributed between the Water Service Authority and the water service provider. The WSA should use part of its Equitable Share allocation (Section 3.4 refers) to meet this budget obligation.

The remaining costs, not dealt with in the discussion above, are for Overheads, Production and Repair and Maintenance. These costs are relatively easy to understand and to "see". It is thus most appropriate that the control of and responsibility for these costs be vested with the water service provider.

As the user distributes costs between the various bodies the model tracks the unallocated balance, or *Total costs not being covered*. A message is shown to indicate that either "all costs are being covered", or that "not all costs are being covered".

Once the allocation is complete, the costs allocated to the water service provider, and only those costs, are carried forward to the final spreadsheet, the *Tariff calculation*.

6.2.11 Tariff Calculation

This is the final sheet in the model. Here the user enters tariffs against all the service types which are included in the case in question. These may include public standpipes, yard taps, yard tanks, house connections, institutional connections and commercial connections. All of the above can have one tariff for those with meters, and one for those without. An additional column allows a charge to be levied against those using handpumps, although it is highly unlikely that this level of service will be charged for (particularly in the light of the free basic water policy).

The tariffs can be made up of a basic charge, a volumetric charge or a rising block tariff, or a combination of two or three of these options.

The user is asked to include the expected bad debt allowance for each service level as a percentage.

For each tariff and demand scenario the model calculates the expected income, and compares this with the costs which have been carried forward from the preceding sheet. The profit or loss is reflected for each demand scenario. The user should try different tariff combinations until the expected income at least matches the expected costs.

Three percent of disposable income is a commonly quoted rule of thumb to judge the affordability ceiling for water services in poor communities⁴ (Department of Water Affairs, 2000). If the tariff is set in such a way that an operating deficit is expected even though the affordability ceiling has been reached, then more of the costs must be shed from the water service provider to the Water Service Authority. If the latter is not an option, then the scheme as planned is unsustainable and the level of service must be downgraded to something more affordable, such as handpumps or rainwater tanks.

Note, however, that willingness to pay and affordability are not necessarily matched. Willingness to pay is most negatively affected by poor service levels, or by expectations or perceptions that water does not or should not have to be paid for.

Chapter Seven Model Application

In order to demonstrate the model a selection of analyses are discussed below. They include a fairly representative RDP water scheme (borehole, electric pumps, large pipe network);; a handpump programme; a shallow wells programme; a gravity scheme; and a household rainwater harvesting programme.

7.1 Analysis of the proposed Qadi Water Project

The Qadi Water project is a proposed RDP water scheme which will be constructed in the next year. The feasibility study and the project business plan have been completed and approved, and all the costs contained in the model run are extracted from those reports (Broughton, 1999). The full model run is included in Appendix C.

The Qadi area has 670 homesteads, with an estimated population of 5378 (8 persons per home). A production borehole has been drilled, and this has sufficient water to supply the estimated future population of 8600 persons with 50 litres per person per day plus 20% losses (i.e. a projected demand of 516 kl/day).

It is planned to supply the community through 20 public standpipes, each serving 10 homes, as well as through 470 yard taps. Allowance is made for 12 schools and 5 shops.

The demand figures used are according to the default table (see Table 6.1). The allowance made for schools is 30 kl/month, and for shops is 10 kl/month. Note that these schools have dry sanitation systems and the water allowance is mainly for drinking and hand washing.

Transmission losses of 40% are used.

Analysis of costs

The project capital cost is R8 031 089, or R1 500 per person served. Of this amount it is estimated that R295 987 is required for mechanical and electrical works. A 100% grant is available from DWAF to construct this scheme, and thus no loan costs will be incurred. The opportunity cost of the grant finance, at 5%, is R33 463 per month.

The default life expectancy is used for the various components, and the resulting expected asset replacement budget is R26 178 per month.

The estimated monthly overhead costs are R5 553, most of which is comprised of staff costs.

The expected production costs are between R823 and R2 827 per month (according to demand).

The budget for repairs and maintenance is R2192 per month, most of which is for local labour.

The long term support and mentorship budget is R8 000 per month.

The projected total cost of the water supply is thus between R76 209 and R78 713 per month, depending on demand (note how small the difference in total costs is between these scenarios). The total cost per kilolitre varies from R46.49 to R11.55, depending on the demand scenario.

Of the above costs, R33 463 (the opportunity cost of the grant finance) is borne by national government. R31 966, for support and mentorship and the replacement costs of the civil works, is allocated to the Water Service Authority. The remainder, or between R10 780 and R12 784 is left to the care of the water service provider.

The above costs translate as follows:

Table 7.1 Modeled costs for Qadi Water Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 46.49 | 6.58 | 19.50 | 20.41 |
| 7 l/c/d | R/hh/month | 113.75 | 16.09 | 47.71 | 49.94 |
| medium | R/kl | 21.61 | 3.24 | 8.98 | 9.40 |
| 15 l/c/d | R/hh/month | 114.86 | 17.21 | 47.71 | 49.94 |
| high | R/kl | 11.55 | 1.89 | 4.72 | 4.94 |
| 30 l/c/d | R/hh/month | 116.74 | 19.08 | 47.71 | 49.94 |

The projected costs per kilolitre and per household at WSP level are quite reasonable. With an average household income in the area of approximately R800 per month, the affordability ceiling is therefore R24/month. The costs per household under all three demand scenarios fall beneath this ceiling. The cost per kilolitre for the medium and high demand scenarios is fair, but the cost per kilolitre in the low demand scenario, at R6.55 per kilolitre, is high. A cost this high may discourage people from using the system, which then sets up a negative cycle of lower consumption and even higher unit costs. Nevertheless the system is planned to supply water mainly through yard taps, and the medium consumption level of 15 litres per person per day is probably reasonable.

On the tariff calculation sheet, a tariff of R4 per kilolitre is tested, combined with a R15 per month basic charge. Users of public standpipes pay R6 per kilolitre. Bad debt of 30% from private

consumers and 60% from users of public standpipes is assumed. The resulting projections are as follows:

low demand:

projected deficit of R2 128 per month

medium demand:

projected surplus of R1 052 per month

high demand

projected surplus of R6 425 per month

If it is assumed that the medium demand scenario is the most probable, then the scheme should be sustainable.

The free basic needs water policy will have to be taken into account, however. With the medium demand scenario, the average water usage is only 3.66 kl/month per household. If the definition of basic needs is taken to be 6 kl/family/month, then there will be no income from this scheme, regardless of the tariff structure.

In such a case there are three options:

- the Water Service Authority takes over responsibility for all costs (but the WSA share of the costs is already R47 per family per month, which may be more than it can afford unless the equitable share grant is increased); or
- the free basic needs policy is applied only to the public standpipes, from which the income is in any case negligible; or
- the scheme should not be built as planned.

If the latter option is chosen, an alternative to supply the community with water is public handpumps and protected springs. The economics of the handpump/spring option are discussed in Section 7.3 below.

It should be noted that the costs included in the model for this analysis are not above average they are fairly typical of current costs in KwaZulu-Natal⁵. Projects which are more expensive than this to construct, operate and maintain are routinely implemented.

⁵

Costs in KwaZulu-Natal tend to be higher than those in other parts of the country due to its very dispersed settlement patterns. Nevertheless, according to DWAF's December 2000 M&E News Bulletin, the national average cost for completed projects in December 2000 stood at R607/capita. This cost includes projects which were implemented four years ago (e.g. presidential lead projects like Shemula and Vulindlela), it excludes contributions from other bodies (up to 50% in some cases, e.g. Vulindlela), and it does not necessarily always indicate the cost required to complete projects (it is not uncommon for projects to be tackled in phases, with the secondary reticulation often not provided in the first phase).

7.2 Analysis of the Nhlungwane Water Project

The Nhlungwane Water project was implemented in 1997. The project draws on a borehole, with a diesel generator and submersible electric pump, two rising mains and four 30 kl reservoirs. From the reservoirs a reticulation system supplies 41 standpipes. Two hundred and thirty seven families are served. The taps are opened for only an hour or less per day - every morning at 07h00. Families are rationed to three 25 litre containers per day (five on Saturdays). The tariff is a flat R7 per family per month, increased from R5 eighteen months ago. If a family is large they have the option to pay double and receive double. The total project cost, for a project serving somewhere around 1600 people, was R300 000, and the community contributed R24 000 on top of that.

An analysis of the detailed pump records which are kept indicates that unaccounted for water is approximately 15%.

Analysis of costs

The project capital cost was R324 000, or approximately R230 per person served. Of this amount it is estimated that R60 000 was required for the mechanical and electrical works. A grant was available from DWAF to construct this scheme, and thus no loan costs were incurred. The opportunity cost of the grant finance, at 5%, is R1 829 per month.

The default life expectancy is used for the various components, and the resulting expected asset replacement budget is R1 422 per month.

The estimated monthly overhead cost is R365, most of which is comprised of staff costs.

The expected production costs are between R230 and R1 379 per month (according to demand).

The budget for repairs and maintenance is R250 per month.

The long term support and mentorship budget, as modelled in this analysis, is only R200 per month, but this only allows for pump servicing support.

The projected total cost of the water supply is thus between R4 296 and R5 445 per month, depending on demand. The total cost per kilolitre varies from R14.33 to R3.03, depending on the demand scenario. For the purposes of this analysis consumption levels of 6 l/p/d, 21 l/p/d and 36 l/p/d are used for the low, medium and high demand scenarios. The actual average consumption is approximately 12 litres per person per day.

Of the above costs, R1 829 (the opportunity cost of the grant finance) is borne by national government, and R1 422 for asset replacement costs is allocated to the Water Service Authority.

The remainder, or between R1 045 and R2 194 is left to the care of the water service provider.

The above costs translate as follows:

Table 7.2 Modeled costs for Nhlungwane Water Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 14.33 | 3.49 | 4.74 | 6.10 |
| 6 l/c/d | R/hh/month | 21.06 | 5.12 | 6.97 | 8.97 |
| medium | R/kl | 4.64 | 1.54 | 1.36 | 1.74 |
| 21 l/c/d | R/hh/month | 23.87 | 7.94 | 6.97 | 8.97 |
| high | R/kl | 3.03 | 1.22 | 0.79 | 1.02 |
| 36 l/c/d | R/hh/month | 26.69 | 10.75 | 6.97 | 8.97 |

The costs per kilolitre and per household at WSP level are very reasonable. With an average household income in the area of approximately R800 per month, the affordability ceiling is therefore R24/month. The costs per household under all three demand scenarios fall beneath this ceiling.

The Nhlungwane Water Project has been operating with a R7.00 per month flat rate tariff, and due to good management of the scheme and strong discipline in the community the incidence of bad debt is negligible. The committee have managed to save R20 000 over a three year operating period.

This scheme shows that small schemes using groundwater can work very cost effectively. It also demonstrates that the use of relatively sophisticated mechanical and electrical equipment can still work with a highly disciplined and motivated community.

7.3 Analysis of a proposed community handpump programme

The KwaNokweja Water project is a proposed community handpump scheme. It is the only known case in South Africa where a community chose handpumps over a reticulated scheme when presented with the options. A pilot phase incorporating ten handpumps was constructed, and a planning report for the balance of the project was completed. Unfortunately the project implementation was cut short in 1999 after DWAF had to make sudden major cuts in its CWSS budgets. Since that time the decision to restart the project has been in the hands of the Regional Council (now District Municipality), and they have not prioritized this project.

The costs contained in the model run are extracted from that experience (Broughton, 1998), as well as from a recent study of handpumps in the province as a whole (Still, 2001).

The Nokweja area has 1 320 homesteads, with an estimated population of 10 500 (8 persons per home). At present the area has fourteen handpumps, but it is proposed to increase the provision to 60. There are some perennial springs in the valleys, and where appropriate springs will be protected instead of handpump construction.

The demand figures used are according to the default table (see Table 6.1) i.e. 5 litres per person per day for the low demand scenario, 12 l/p/d for the medium demand and 20 l/p/d for the high demand scenario.

Analysis of costs

The project capital cost is R1 786 824, or R170 per person served. Of this amount it is estimated that R360 000 is required for mechanical and electrical works. It is assumed that a 100% grant will be available from DWAF to construct this scheme, and thus no loan costs will be incurred. The opportunity cost of the grant finance, at 5%, is R7 445 per month.

Allowance is made to replace pumps after 10 years, and boreholes after 40 years. The projected asset replacement cost is R6 433 per month.

The estimated monthly overhead cost is R310, which allows for a part-time bookkeeper/administrator.

There is no production cost.

The budget for repairs and maintenance is R1 225 per month, which is evenly split between materials and local labour.

The long term support and mentorship budget is R3 900 per month.

The projected total cost of the water supply is thus R19 313. The total cost per kilolitre varies from R22.17 to R5.54, depending on demand scenario⁶. The medium demand scenario would be realistic with a high coverage of handpumps like this - for this the cost per kilolitre is R9.24 per kilolitre.

Of the above costs, R7 445 (the opportunity cost of the grant finance) is borne by national government, R10 333 per month is allocated to the Water Service Authority, and R1 535 is allocated to the community Water Service Provider.

The above costs translate as follows:

Table 7.3 Modeled costs for KwaNokweja Handpump Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 22.17 | 1.76 | 11.86 | 8.55 |
| 5 l/c/d | R/hh/month | 26.82 | 2.13 | 14.35 | 10.34 |
| medium | R/kl | 9.24 | 0.73 | 4.94 | 3.56 |
| 10 l/c/d | R/hh/month | 26.82 | 2.13 | 14.35 | 10.34 |
| high | R/kI | 5.54 | 0.44 | 2.97 | 2.14 |
| 20 I/c/d | R/hh/month | 26.82 | 2.13 | 14.35 | 10.34 |

The required monthly contribution per house at Water Service Provider level is R2.13, which is affordable by any standard. In this particular case a decision was made to levy R3 per month per family, the decision only being arrived at after a series of workshops and discussions. In the event the committee did not manage to collect many payments. A reason given for this was that the neighbouring communities (with handpumps provided on traditional lines) were not required to make any contributions to their running cost.

The free basic needs water policy implies that no payment will in any case be expected for a basic level of service such as a handpump. The WSA will therefore have to pick up any costs that might otherwise have been covered by the WSP.

7.4 Analysis of costs of Ubombo Family Wells Programme

In cases where the groundwater is shallow (say less than 20 metres) there is a compelling

For hand pumps the default demand scenarios are 5, 10 and 20 litres per person per day for low, medium and high demands respectively.

argument to move from shared public handpumps to private family wells. This is the basis of the very successful family wells programme in Zimbabwe, which has seen over 30 000 family wells upgraded in the last decade (Broughton, 1996).

A South African programme modeled to some extent on Zimbabwe's family wells programme is the Ubombo Family Wells Programme. The Maputaland coastal plain of northern KwaZulu-Natal is one of South Africa's most extensive aquifers. Among the best known of its many natural lakes and estuaries are Kosi Bay, Lake Sibayi and Lake St. Lucia. The area is also home to approximately 100 000 people. The water table in the fine coastal sands is generally encountered somewhere between 5 and 20 metres below the surface. It has been found that it is possible to augur and construct slotted and cased 125 mm tube wells in these sands using only manual labour, for a programme cost of R5 600 per well. These wells are finished off with an apron and a simple water bailer on a windlass. To date over 300 of these wells have been constructed. (Nash, 2001).

In order to ensure that wells are only built where they are wanted, and where people will be prepared to look after them, an up-front capital contribution of R600 is required before a well is constructed.

After three years' experience, the only maintenance requirements are the repair of ropes and bailers, which the owners have taken care of at their own expense.

Analysis of costs

The wells are family wells close to the houses, and there is no cost for extracting water. Therefore relatively high consumption levels can be used in the model: 20 litres/person/day for the low demand scenario, 30 l/p/d for the medium demand scenario and 40 l/p/d for the high demand scenario.

Assume that an area with 700 homes is to be supplied by wells. The programme capital cost will be R3 500 000, where the R420 000 from the beneficiaries' up-front capital contributions is discounted. The cost is R625 per person served (although in reality it is found that two or three families sometimes share a well, in which case the costs are lower).

Assume that a 100% grant is available from DWAF to construct this scheme, and thus no loan costs will be incurred. The opportunity cost of the grant finance, at 5%, is R14 583 per month.

Assume that after 20 years the well has to be reconstructed. The monthly asset replacement cost is R17 640.

There is no production cost.

bailer maintenance.

Well owners do spend an average of approximately R72 per year or R6 per month on the upkeep of their bailers, but this cost is not to the WSA's account. The total monthly cost of bailer maintenance (for 700 wells) is R4 200 per month.

Support and mentorship is advisable mainly to ensure that the important aspects of monitoring and evaluation, health and hygiene are not neglected. An reasonable allowance is R2 250 per month for an area of this size.

The above costs translate into costs per kilolitre and per month as shown in Table 7.3. Total costs per family per month amount to R53.38 per month, of which R26.55 should be budgeted for by the Water Services Authority, and R6.00 by the Water Service Providers (the well owners). The cost of the water per kilolitre varies between R11.86 and R5.93, depending on demand. Of this cost between R1.75/kl and R0.87/kl must be borne by the users, most of which is for rope and

The Ubombo Family Wells Programme, on the strength of the above analysis, is affordable and sustainable. The fact that the water is still not entirely free to the consumers can be justified on the basis that this is a higher than RDP level of service.

Table 7.4 Modeled Costs for Ubombo Family Wells Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 11.86 | 1.33 | 5.90 | 4.63 |
| 20 I/c/d | R/hh/month | 53.38 | 6.00 | 26.55 | 20.83 |
| medium | R/kl | 8.90 | 0.89 | 3.93 | 3.09 |
| 30 I/c/d | R/hh/month | 53.38 | 6.00 | 26.55 | 20.83 |
| high | R/kl | 5.93 | 0.66 | 2.95 | 2.32 |
| 40 I/c/d | R/hh/month | 53.38 | 6.00 | 26.55 | 20.83 |

7.5 Analysis of the Tsita gravity water supply scheme

One of the more interesting projects surveyed during the field research phase of this project was the Tsita Water Project in the Wild Coast/EG Kei District of the Eastern Cape. This multi-village project is supplied entirely by gravity. Unsurprisingly, the associated costs are more affordable than other RDP schemes, which mostly incorporate pumping. The Tsita project supplies nine villages incorporating 1900 homesteads, with an estimated population of 13 000. Measured consumption is 13 litres per person per day. There are 108 unmetered public standpipes and 20 private connections.

The demand figures used for the model are according to the default table (see Table 6.1) i.e 6 litres/person/day for the low demand scenario, 21 litres for the medium demand and 36 for the high demand. The measured demand falls between the low and medium demand scenarios. No allowance has been made for schools or shops in this particular model run.

Analysis of costs

The project capital cost is R2 500 000, or R192 per person served. The scheme's capital costs were fully subsidised, and thus no loan costs were incurred. The opportunity cost of the grant finance, at 5%, is R10 417 per month.

The default life expectancy is used for the various components, and the resulting expected asset replacement budget is R6 217 per month.

The estimated monthly overhead costs are R980, most of which is comprised of staff costs.

The budget for repairs and maintenance is R2 029 per month, most of which is for local labour.

An appropriate long term support and mentorship budget is R4 800 per month.

The projected total cost of the water supply is thus 24 443 per month. The total cost per kilolitre varies from R6.99 to R1.17, depending on the demand scenario.

Of the above costs, R10 417 (the opportunity cost of the grant finance) is borne by national government. R11 017, for support and mentorship and the replacement costs of the civil works, is allocated to the Water Service Authority. The remainder, R3 009 is left to the care of the water service provider.

The above costs translate as follows:

Table 7.5 Modeled costs for Tsita Water Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 6.99 | 0.86 | 3.15 | 2.98 |
| 6 l/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |
| medium | R/kl | 2.01 | 0.25 | 0.90 | 0.86 |
| 21 l/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |
| high | R/kl | 1.17 | 0.14 | 0.53 | 0.50 |
| 36 I/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |

The costs per kilolitre and per household at WSP level are very economical. The current tariff on the scheme is R3 per family per month. Those with private connections are expected to pay the same rate (R3 per month), get their first 4.5 kl for no extra cost, and pay R10/kl thereafter.

The field survey indicated that approximately half of the families are paying the R3 monthly tariff, and the WSP's average monthly income is R3000, just enough to cover commitments.

7.6 Analysis of the costs of household rainwater harvesting systems

Unfortunately there are many rural areas which are unsuitable for gravity water schemes or handpumps. Even in areas with shallow water tables, such as Maputaland (see Section 7.3 above) it has been found that in some localities the presence of impervious clays makes shallow wells impractical.

The most neglected water supply option in South Africa is rainwater harvesting. There are probably four main reasons for this:

- the quality of rainwater after passing over a roof does not meet potable water standards;
- the long dry season means that either large expensive storage must be constructed, or else winter consumption levels must be kept very low;
- it is in the nature of government programmes to create large projects with boreholes, dams and pipes - rainwater harvesting is not even in the frame; and
- the standards of roof construction in rural areas are typically not good enough for rainwater harvesting.

However, rainwater can be filtered and disinfected. Water storage is not as expensive as people may think, particularly if water conservation measures are practiced in winter, and if people stick to dry sanitation (e.g. pit toilets, not flush toilets). There are also innovative methods of collecting

Table 7.5 Modeled costs for Tsita Water Project

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kI | 6.99 | 0.86 | 3.15 | 2.98 |
| 6 l/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |
| medium | R/kI | 2.01 | 0.25 | 0.90 | 0.86 |
| 21 l/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |
| high | R/kI | 1.17 | 0.14 | 0.53 | 0.50 |
| 36 l/c/d | R/hh/month | 12.24 | 1.51 | 5.52 | 5.22 |

The costs per kilolitre and per household at WSP level are very economical. The current tariff on the scheme is R3 per family per month. Those with private connections are expected to pay the same rate (R3 per month), get their first 4.5 kl for no extra cost, and pay R10/kl thereafter.

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- the standards of roof construction in rural areas are typically not good enough for rainwater harvesting.

However, rainwater can be filtered and disinfected. Water storage is not as expensive as people may think, particularly if water conservation measures are practiced in winter, and if people stick to dry sanitation (e.g. pit toilets, not flush toilets). There are also innovative methods of collecting

rainwater off uneven, or even circular roofs, so roof construction is also not a real obstacle. (Gould, 1999, and Morgan, 1998)

It is thus worthwhile investigating the probable costs of a major rainwater harvesting programme.

For the purpose of this discussion the assumed low, medium and high consumptions are 5, 10 and 20 litres per person per day 7.

Analysis of costs

Assume a programme aims to build rain water systems at 700 homes (these may not all be in exactly the same geographic area - these could be homes in infill areas not served by piped schemes). Assume that the value of the grant, which can be used for guttering, storage and roof improvements, is R6 000 per family, or R750 per person (assume eight persons per family). In order to ensure that rainwater systems are only built where they are wanted, and where people will be prepared to look after them, an up front capital contribution of R600 is required before the grant is issued. The grant may be issued in materials and professional assistance, rather than cash. The programme capital cost will be R4 200 000, where R420 000 from the beneficiaries' up-front capital contributions is discounted. The cost is R750 per person served.

Assume that a 100% grant is available from DWAF to construct these systems, and thus no loan costs will be incurred. The opportunity cost of the grant finance, at 5%, is R17 500 per month.

Assume that the asset replacement period is 15 years. The monthly asset replacement cost is then R21 876.

There is no production cost, and also no monthly overhead costs or repair and maintenance costs. System owners would have to attend to roof, gutter, tank and filter repairs at their own expense.

Support and mentorship is advisable mainly to ensure that the important aspects of monitoring and evaluation, health and hygiene are not neglected. An reasonable allowance would be R2 300 per month for a programme of this size.

The analysis yields a water cost of between R40.77 and R10.19 per kilolitre, and a cost of R59.54

In reality a family reliant on rainwater will regulate its consumption, using water more freely during the rain season, and more conservatively during the dry season. A family of eight using 5 litres per person per day can last just over four months on 5 000 litres of rainwater. If they have 50 m² of roof connected to that tank, 100 mm of rain, say 120 mm allowing for losses, will fill their tank. Annual rainfalls in South Africa are highly variable, but most areas receive more than 300 mm in most years (Schulze, 1997). Only the Western and the Northern Cape provinces have median annual rainfalls below 300 mm. The areas of most interest to rural water supply, the Eastern Cape, KwaZulu-Natal and the Northern Province have median rainfalls of 528, 819 and 517 mm respectively.

per family per month. Of these costs R7.14/month would be borne by the homeowner, R27.39 per month by the Water Services Authority, and the remaining R25 by national government.

If the Free Basic Water Policy had not been promulgated it would still be reasonable to expect families to pay all future maintenance and replacement costs on their rainwater harvesting systems, and the WSA's role would then be limited to a support and monitoring. However, since the policy has been promulgated local government structures have to demonstrate to national government that they are using the equitable share funding to provide free basic services.

In certain areas the Free Basic Water requirement might have to be met by providing rainwater harvesting assistance as described in this section. In dry areas and in dry seasons it will, however, not be possible to provide as much as 6 000 litres per family per month.

Table 7.6 Modeled costs for a rainwater harvesting programme

| Scenario | Definition of cost | Total Costs | Water Service Provider | Water Services Authority | National Govt. |
|------------|--------------------|-------------|------------------------------|--------------------------------|-------------------|
| low demand | R/kl | 40.77 | 4.89 | 18.76 | 17.12 |
| 5 l/c/d | R/hh/month | 59.54 | 7.14 | 27.39 | 25.00 |
| medium | R/kl | 20.39 | 2.45 | 9.38 | 8.56 |
| 10 l/c/d | R/hh/month | 59.54 | 7.14 | 27.39 | 25.00 |
| high | R/kl | 10.19 | 1.22 | 4.69 | 4.28 |
| 20 l/c/d | R/hh/month | 59.54 | 7.14 | 27.39 | 25.00 |

Chapter Eight

Discussions, Conclusions and Recommendations

The objectives of this research were set out in the original proposal as follows:

- To determine the minimum factors which constitute the monthly running costs of standalone community supply schemes to ensure that the schemes are operated and maintained in a sustainable manner utilising local resources.
- To obtain empirical data for the monthly running costs from existing water supply schemes, hence
- To develop a financial framework, which provides guidelines to consultants, planners and local authorities on the basic monthly running costs of such schemes.

The lessons from over two decades of work all over the developing world indicate the importance of user payments in achieving the goal of sustainable water supply. Without such payments there is a tendency for government driven programmes to produce inappropriate projects which do not serve real needs. For this reason it has become urgent to get a clear picture of the costs of rural water supply.

8.1 Lessons from a survey of operating community run water projects

Over forty operational stand alone type rural water projects were visited and surveyed in order to obtain a picture of the kinds of operation and maintenance costs which are being experienced in the field. The data from these projects is summarised in tables and an appendix to this report.

The key observations from this field work were as follows:

i) Water Consumption

Although water consumption can in most cases only be estimated from the data gathered, the indications are that the median water consumption in rural areas is low, less than 4 kl per month. Schemes with metered yard taps recorded relatively low consumptions, but those with unmetered yard taps recorded higher consumptions. For example, the average consumption at Emayelisweni/Montebello was just 3.12 kl/hh/month, or 8.7 litres per person per day (but this is based on the assumption that each yard tap is shared by 12 people - which may be an overestimate). The only schemes which have consumption figures above 25 litres per person per day, or 6 kl/family/month, are the Fairview and Nomponjwana schemes in KwaZulu-Natal, both of which have unmetered yard connections. The estimated consumption figures for these two schemes are 16.07 and 8.14 kl/hh/month respectively.

A common observation is that where consumers have to carry their water more than 100 metres, consumption will not exceed approximately 12 litres per person per day.

ii) Cost per family per month

The budgeted costs per family per month are low. The mean figures are R9.15, R5.49 and R3.87 for KwaZulu-Natal, the Northern Province and the Eastern Cape respectively. However the spread of figures is wide - the standard deviations of the mean in the provinces are R8.62, R6.81 and R2.80 respectively. In other words the majority of projects are running on budgets of less than R15 per family per month, and some much less. The highest recorded budget cost per household per month is R33.30 for Emayelisweni/Montebello in KwaZulu-Natal, but this figure is misleading because DWAF paid a number of large pump repair bills during the period under review. Similarly the figure for Claremont in the Northern Province is high, but DWAF is paying most of the cost (R1900/month for operator's wages).

Caution needs to be exercised in drawing any conclusions from the data, as some projects were not able to declare the details of the operational subsidies which they are receiving. For example, in the Northern Province it is common for DWAF to pay the cost of pump servicing, fuel and operators wages. However, although it is common, it is also not standard on all projects, so it is hard to know how to adjust for this hidden subsidy.

iii) Cost per kilolitre

The mean budget cost per kilolitre is R4.96 in KwaZulu-Natal, with a standard deviation R3.58.

In the Northern Province the mean is R1.76, with a standard deviation R1.36. In the Eastern Cape the figure is R1.61 in KwaZulu-Natal, with a standard deviation R0.90. The higher costs in KwaZulu-Natal are indicative of the greater use of water meters or water vendors in that province.

iv) Water tariffs

Water tariffing practice varies from scheme to scheme. The flat-rate monthly payment system is the most popular cost-recovery option, employed by 31 of the 38 projects surveyed. Of the seven with water metering, six were in KwaZulu-Natal, and one was in the Eastern Cape.

The mean flat rate was R9.40/hh/month, with a standard deviation of R5.89. In other words, the typical range of monthly charges on community water projects with flat rate charges is between R4 and R16. In KwaZulu-Natal the mean flat rate charge was R14.63, with a standard deviation of R8.50, whereas in the other provinces it was lower (Northern Province mean R8.19 with std. dev. R2.40, Eastern Cape mean R5.30, std. dev. R2.99).

On the seven projects where water was being charged for at a metered rate, the mean rate was R5.70/kl, with a standard deviation of R2.36/kl.

v) Bad debt levels

The levels of bad debt are in general representative of projects which are operating. The typical levels of payment are 70%, i.e. some 30% of the people served are defaulting.

Some anomalies are evident in the tables. For example there are four schemes (KwaNyuswa, Mission and Mvunyane in KZN and Claremont in the Northern Province) which have reported receipts over the six month survey period in excess of budgeted income. There are two possible explanations: either the period included receipts from people who were paying off several months at once; or the receipts recorded do not distinguish between payments for water and connection fees. The latter is the more probable explanation.

vi) Absence of savings

The most notable thing about saving for asset replacement, is that it is generally not happening. This is to be expected in poor rural communities, where life is sustained on a hand to mouth basis [In fact in many poor communities the only time money can be collected for asset replacement is when the matter becomes critical]. The expenditure figures obtained thus do not adequately reflect the long term operation and maintenance costs, and as such do not represent the real costs of operating these schemes (compare, for example, the Emayelisweni figures, which do include substantial repair bills in the period under review).

However, there is concern that when a major repair cost does present, e.g. if the diesel engine needs to be reconditioned, or the electric motor is damaged by lightning, then there are no savings available to meet the cost.

vii) Schemes operating in deficit

Several of the schemes were operating in the red (the more notable examples being Dicks, Emayelisweni, Ngolokodo and Ezinqeni in KZN, Claremont; and Seokodibeng, Mankotsana and Mars in the Northern Province). These projects are still operating either because they are not paying their accounts or their staff and getting away with it (e.g. Ezinqeni), or because they receive operational assistance from DWAF.

viii) Cost effectiveness of gravity schemes

The 38 projects surveyed included three gravity schemes where no pumping was required, two in KwaZulu-Natal (Vukanathi and Zamimpilo) and one in the Eastern Cape (Tsita). A distinctive feature of these projects are their very low operating budgets. The budgets for the three projects are: Tsita R1.37/hh/month; Vukanathi R0.63/hh/month; and Zamimpilo R1.09/hh/month. The corresponding tariffs are R3/hh/month, R7 and R10. At Vukanathi it appears that no-one is paying the tariff, but as this is a gravity scheme it was at the time of the survey still functioning.

ix) Cost effectiveness of community management

It is notable that the typical wages paid to staff are very modest. Wages of R200 to R500 per month are typical. Although the work is part-time, there is clearly a spirit of community service at work in these projects. These low staff costs are also a reflection of the cost effectiveness of community level management, compared with management from the nearest urban centre.

Also notable is the very negligible amounts being spent on transport. Most projects are not needing to spend more than R200 per month on transport, although the median expenditure is much less than that. This is again a reflection of the cost-efficiency of community level management.

8.2 Development of WRC Cost and Tariff Model for Rural Water Supply

Four existing water supply financial models are reviewed in this report. They are:

- the DWAF/Ninham Shand Water Supply Service Levels model;
- ii) the Mvula Trust's Help manual on rural water credit;
- iii) the Palmer Development Group's Water Supply Services Model; and
- iv) the Raftelis model.

These models have each been developed for a specific purpose. The Mvula Trust's Help Manual for Rural Water Credit is structured to assess the advisability of using loan finance to upgrade a community water supply. It combines a needs analysis, income and affordability data and a cost model to assess whether a project will generate sufficient income to pay back a loan.

The Palmer model, on the other hand, has been developed primarily for the managers of urban water supply systems. The model enables planners to assess the viability of new infrastructure investments in the light of the needs of their changing and growing cities. This model is widely used in South Africa.

It was concluded that a cost and tariff model tailored specifically for rural water supply in South Africa should have the following features:

- i.e it must be possible to run the model either at a simple level, or at a more complex level i.e it must be possible to use the model even if accuracy is compromised, even if only the bare details regarding a scheme are known, or if the user does not have the time to fill in all the information which is known. However, the user that has the detailed information and the time to run the model at a more sophisticated level should be able to do so.
- The model must separate costs into a logical framework, i.e. capital costs, asset replacement costs, overhead costs, production costs, repair and maintenance costs,

support and mentorship costs.

- No costs must be hidden. Any subsidies applicable must only be taken into account once all real costs have been determined. (One of the uses of the model is for the comparison of the economics of different options - this can obviously not be done if any costs are hidden).
- iv) All data must be entered only once in the model, to avoid situations where a change in the value of a key variable at one point is not reflected at another point.
- v) It must be possible to model any simultaneous combination of Levels of Service. While a scheme may primarily supply water via community standpipes, for example, it may also include a large number of yard connections.
- vi) Where possible the model layout, structure and terminology should reflect the Department of Water Affairs and Forestry's Operation and Maintenance reporting system for rural water schemes. During the last two years a fairly comprehensive O&M reporting system has been developed by DWAF and Umgeni Water specifically for rural water schemes. This reporting system uses certain terminology and cost codes, all of which have been reflected in the relevant pages of this model.
- vii) The model must be able to process simultaneously various water demand scenarios. This is important because cost per kilolitre is generally very sensitive to demand, mainly because the fixed costs (capital costs, asset replacement, rental charges and salaries) tend to be the dominant factor in the pricing of water, particularly rural water.
- viii) The levels of water loss and bad debt must be explicit. Water losses and bad debt can jointly affect the cost of water by an order of magnitude. It is thus critical that these aspects of pricing are clearly dealt with at the relevant points in the model.
- ix) The model must distinguish between total population and population served. It is misleading to base tariff calculations on the total population in a project area if not all these people are served by the project.
- Loan and grant finance must be separately specified.
- xi) The model must reflect the effect of inflation on asset replacement costs.
- xii) The model must allow for cost sharing between Water Services Authorities, Water Services Providers, National Government and other stakeholders.
- xiii) In setting tariffs, users must be able to use a combination of fixed charges and volumetric charges (with rising blocks, if required) for any level of service. The user must be able

to specify different tariffs and charges for each different level of service.

xiv) The model must reflect costs in terms of both volume of water supplied (R/kl) and in terms of households served (R/hh). The volume of water supplied here must exclude losses. The cost per kilolitre is important indicator of the effectiveness of a water supply scheme. The monthly cost per household served is an important indicator of affordability.

A model meeting the above criteria has been developed, and is described in Chapter 6 of this report. This was the key objective of this project. Provisionally this model is called the WRC Rural Water Supply Cost and Tariff Model.

Six case studies are presented in Chapter 7 - two pumped water schemes, a handpump programme, a shallow well programme, a gravity water scheme and a rainwater harvesting programme. The model shows how widely real costs vary, both within a case study according the level of consumption, and between studies. It is shown that asset replacement and support and mentorship are or will become major factors in the cost of rural water supply.

The model can be used to test how the Free Basic Water Policy can be implemented. It is concluded that the policy means that local government must carry practically all costs on rural water schemes (which in some cases will require additional assistance from national funds). The policy might therefore cause local government to rethink the suitability of more modest technologies such as handpumps and rainwater harvesting.

8.3 Recommendations

It is recommended that the WRC Rural Water Supply Cost and Tariff Model be demonstrated and freely distributed to practitioners in the field. If the model is found to be appropriate and useful, then it is further recommended that t is used as a standard for the calculation of costs and tariffs for rural water supply projects in South Africa, and is included with project planning reports for this purpose.

It is further recommended that the Department of Water Affairs and Forestry require all Water Services Authorities to keep up to date records of all operation and maintenance data on all rural water schemes under their jurisdiction, and that for this purpose a standard format is used to enable easy comparison and transfer of data. The standard format should provide sufficient information for completion of the DWAF O&M report for Rural Water Supply Schemes.

Finally, it is recommended that the WRC Rural Water Supply Cost and Tariff Model is updated according to the evolving needs of the model's users, and according to the observations made from the ongoing monitoring of rural water projects. Ideally, the up to date model should be available to the public from a website.

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University of Durban Westville

WATER RESEARCH COMMISSION PROJECT NO. K5/886

Introduction:

The Water Research Commission (WRC) is undertaking a research project to gather operation and maintenance data on working rural water supply projects throughout South Africa. The Myula Trust is working with the University of Durban Westville to assist the WRC to gather this data. Thank you for agreeing to help gather data for this important research work. This data will help local, provincial and national governments, as well as consultants, NGOs and communities, to design water supply schemes that are affordable for communities.

Data Collection Forms used in the Survey

| Project Name (& Number): | NHLUNGWANE WA | ren Photect |
|--|---------------|----------------|
| Province: | KWATILLO MATA | |
| Date of Field Assessment: | 13 NOVEMBER 1 | |
| Interviewers Name: | KHOSI NHLAPO | |
| Water Source: | BOREMOLE | (> 100 kl/hr. |
| Power Supply: | DIESEL ENGINE | pump well. |
| Treatment Type: | North | 1 |
| Distance to nearest Water supply scheme | | |

| Length of pipework and size | ~ 14 km. | |
|--|----------------------|---|
| Date of completion | 1996 | |
| Capital cost of construction | 123 co ato. | ٦ |
| No and size of Bulk and consumer meters | A RESERVORS 4×30 61. | 1 |
| Other available infrastructure details. | | |
| Shared O&M arrangements | | |

del 30 kl for 48 ho.

| Project Information | |
|---|--|
| Households served (and comment on the | 204 |
| number served per km² – the density) | 204 |
| What is the tariff being paid? | Started of RS.co |
| Pre-paid meters | mared up = n 200. |
| Metered Flat-rate (fixed) YES | 4 |
| The through the third the | PLT PER HOUSEHOLD / MONTH |
| How many people paid over last six months? | |
| (for flat-rate, pre-paid, metered), : | |
| 1 MAY 199 | Patrick Mbanjus & Rud: Schreeder pat in lots of training. Emphasised need to pay. |
| 2 00.12 | |
| 3 July 202 | Good committee. Charledy + timpageri. Wave Army. 2 active men |
| 4 Aug 203 5 3487 203 | , |
| 5 SEFT 103 6 DOT 203 | |
| How was the tariff determined? – Give a | Agrando que logo |
| breakdown of the tariff | encyst put |
| En editorni of the farm | The Paper |
| Has the tariff been increased since the start of | V 16 112 11 |
| the project - how often and by what amounts? | YES - recreased from what? when? |
| How was the increase determined? | |
| Do records of monthly income and expenditure | ., |
| exist? | NES |
| What was the income and expenditure over the | INCOME EXPENDITURE |
| last six months? (Income / expenditure) | R 1 191 30 R 667 00 Nde: Surplus being 1111 |
| 1 May | |
| 2 JUNE | RI. 160 50 R779 00 Payment average coments |
| 3 July | 171440 40 |
| 4 Aug | R 1 570 00 R965.00 R5274.00 |
| 5 SEPT | R 1. 699 00 R 8613/6 R 1, 244 00 R5274.00 |
| 6 DCT | 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| Lancard Communication of London Class C | 11.592.00 = 21435.50 K1,572.00 = 2879.00 |
| Income from new connections' fees (last 6 | R120 00 |
| months) Is there a limit on the quantity of water that can | |
| be drawn on a daily basis by a household? | YES (3 125 l per family / day) - still the same. |
| Are funds saved for major repairs? | The state of the s |
| If so, how much. | YES, BUT NOT PROUGH |
| Is it held in a separate account | NES . |
| Are there any yard connections? | No |

Water Research Commission, The Media Trust, University of Dutton Westville, WRC Monthly Lantf Project 6.1.7204(1

| How many are there? | None |
|--|--|
| What tariff is paid for a yard connection? | None |
| How is the amount of water used at a yard connection controlled? | None |
| Consumer Connections categories Domestic — 4 I PABLIZ STANDPIPÉS Institutional — 1 SCHOOL Commercial — 1 SHOP Other (specify) | Number of connections for each: Total (6) monthly consumption for each: % of Total for each: |
| Are there any Reservoir taps (how many?) How many Standpipes are there? Are there any House tank, fed from reservoir? | 21 -? 76? |
| Does the scheme deliver water all day or is it opened at certain times. | OPEN AT CERTAIN THOES 7.00 am at 16 how for 1/2 hour out time. Superned |
| How often do you pump? | 2 x per week |
| How long do you pump for? | |
| Record the hours of operation for a diesel engine over the past six months: | |
| How much water do you pump (e.g. the committee may say that they fill the reservoirs twice a week) | |
| Do you take a meter reading If no, – What is the size of the reservoir(s). If yes, how often? - Is it each time you start and stop pumping? - Or is it once a month (If readings are available please give details) | No neterready. |

| Determine the quantity of water pumped in the month for the last six months | | |
|--|---|--|
| | DO NOT KNOW. | |
| How much do you pay for electricity / diesel each month | 316 | |
| Do you have the records for the past six months (kWh / amount or litres) | | |
| Do you pay a fixed monthly rental to Eskom | | |
| What is the make and model of: - the Pump - the Motor? (include KW rating on plate on motor, and any other specifications noted) - diesel engine?(include type & horse power) | Gentl + Fubmersible. SuperD. | WA. Hurs of use ? Still has original bathery. |
| What is the Pumping Head (in metres), capacity (volume/lime) (estimate in case of lack of data) & other specifications | 11 S m. | |
| Bulk Supply (if exists) Volume supplied in last 6 months | | |
| Cost of Bulk supply in last 6 months | | |
| Size of bulk meters (in diameter of input pipe) | | |
| Transport Costs | | |
| What are the transport costs associated with: | | |
| - Durchasing diagal and getting it to the service | BCA DED ALGUARA | |
| Purchasing diesel and getting it to the engine Purchasing of spares | RS4 PER MONTH RSO DNCE AFTER 2 MONTHS R | What |

| - Filter sand replacement | | |
|---|--|--|
| - Payment of accounts | Primary and the companies of the compani | |
| Other costs (please specify) | | |
| ROUTINE MAINTENANCE | | |
| Engine and pump | | |
| How much oil does the engine use | 30 LITEC @ R167. DY + YAT | |
| How often is the oil filter replaced, what does it cost | AFTER 250 WORKING HOURS SEO 100. | |
| How often is the motor / pump serviced | | |
| What does it cost to be serviced? | DO NOT KNOW | |
| Treatment | DO NOT PINEM | |
| What chemicals do you purchase?: include how often, and the cost. | | |
| How often to you clean the filters? | | |
| Who does it (what is their function or role?) | | |
| How much does the sand cost? | | |
| Reservoirs | | |
| How often do you clean the reservoirs? | YES, THICK SINCE 1996 | |
| Who does it (what is their function or role?) | LOCAL LABOUR | |
| How much does it cost? | VOLUNTARY | |
| Reticulation | | |
| Have you had to repair any pipes? | D€S . | |
| What materials did you use? | PIPES AND FITTINGS | |
| How much did they cost? | ESTIMATION - ROSO PER MONTH | |
| Who did the repairs? | COMMITTEE MEMOERS - MA NGUBANE & MAS MZILA | |
| How often do such repairs need to be done? | NOT VERY OFTEN | |
| Standpipes | | |
| How often are these repaired? | NOT VERY DETEN | |
| Who does it (what is their function or role?) | COMMITTEE MEMBERS - MIN NOLIDANE 4 MAS MAILA | |
| How much does it cost? | Raop | |
| Store Room | | |
| Do you keep stock? | None | |
| What type of stock? | PLIERS, PICKS, SPACES AND WHILLBARROW | |
| - for routine maintenance? | CIDE AVAILABLE TODES 4 MA NOUBARE'S | |
| - for unexpected maintenance? | Nont | |
| Value of stock? | RSOD | |
| What method do you use to restock (minimum inventory list?) | No method used | |
| How often do you restock? | AS NEED ARISES | |

250 .. only filter Sco. . fuel filter 1000 ... in line filter.

| When do you decide that it is time to restock? | WHEN THERE'S SHORTAGE | |
|--|--|--|
| Do you pay rental for the store? | No | |
| Unpaid Debts | | |
| Are there any debts that the committee owes | JES. HYDROGUEST = A3,500 | Nathana Para A cont |
| or the water supply (eg: Eskom, Operators | paid Munka wouldn't | Reco , 1 kity. |
| pay, local store, etc). List the | Taid I will come a | (Leco in killy. |
| person/organisation owed, and the amount | Dam trainy. | .~ |
| /andalism / Lost /Broken Assets | | |
| Are there any assets that have been broken or | VANDALISM TAMPERING WITH STANDPIPES | |
| ost? List the item and the cost to replace | | |
| Does the committee intend to fix them? | PALPARED TO FIX | |
| nstitutional / Management | | |
| How many committee members are there? | I MR M DLAMINI - CHAIR PERSON M | or Phrosule want to inspect - works to |
| (List names). | Z. MAS B MZILA - ADDITIONAL MEMBER | 17 - 134 |
| f there is more than one committee (to server | 3 MRS B DLAMINI - ADDITIONAL MEMBER | |
| more than one village) - then say how many | 4 MAS B MASIKANE - TACASHER | |
| committees and list all names | 5 MRS G NOUBANE - VICE - CHAIRPEASON | gate they. |
| | B MR M. NOUBANE - ADDITIONAL MEMBE | Duzani - Secretary |
| | 7. MAS E ZUMA - SECRETARY | |
| | & MR M MADONDO - ADDITIONAL MEMB | ER. |
| | MAS K. MAPHUMULD - ADDITIONAL ME | MBER |
| What are their qualifications | I. MA M. DIAMINI - NATIONAL DIPLOMA- (| TEACHINGS |
| | 2 MRG B MRILA - GRADE II | |
| | 3 MRS B. DLAMINI - GRADED | |
| | 4 MAS B MASIEANE - GEADE & | |
| | 5. MAS & NGUBANE - GRADE 7 | |
| | 6 MA M. NGUBANE - GRACE 10 | |
| | 7 MRS E ZUMA - GRADE IZ 8 MR M ALADONDO - GRADE S | |
| | 9. MRS K MAMUNULO - GRADE 5 | |
| What are their occupations: | MR M OLAMINI - TEACHER | |
| | 2 MAS & MAILA - PUMP DPERATOR | |
| | 3 MAS B DLAMING - UNEMPLOYED / HOUSE | KELPER |
| | 4 MRS 8 MASIKANE - 11 | |
| | 5 MAS G NOUDANE - 11 | |
| | 6 MR M NGUBANE - 11 | |
| | 7 MRS E. ZUMA - STUDENT | |
| | 8 MM M MADONDO - HNEMPLOYED | |
| | 9. MRS K MAPHUMAD- " | |

| Who does the project pay and how much | and the state of t | |
|--|--|--|
| Operator / Forman | NAS B MAILA KSOD MONTH | |
| Book keeper | MAS E ZUMA RED / MONTH | |
| Tariff collector | Rivor total | |
| Standpipe minder Treasurer | 11400 000 | |
| Committee Members | | |
| Store Man | | |
| | | |
| Rumber | MA NOVERNE REO MONTH | |
| Which of the committee members are active? | MR NGUBANE, MK DLAMINI AND MAS MZILA | |
| Have peoples wages increased since the start | | |
| of the project. | YES . | |
| If yes, by what amount? | SES, RIDD ONLY FOR THE DECRATOR | |
| How was this increase determined? | | |
| Does anybody do voluntary work | YES, THE COMMITTEE AND THE STANDPIPE - MINDERS | |
| What type of bank account is used? | SAVINAS | |
| What is name of banking institution? | STANDARD BANK - GIREYTDINIV | |
| Does the committee receive any external | | |
| support or subsidy? | AI. | |
| List: type of subsidy and cost per month | None | |
| Sustainability Issues:(briefly report on the following) | | |
| How does the committee handle breakdowns i.e. what procedure is followed. | D'THE COMMITTEE WILL ACCESS THE COMMITTEE | |
| How are extensions to the project done? | None | |
| How does a consumer apply for a yard connection and how is it implemented. | None | |
| What is the response time to repairs? | WITHIN 48 HOURS, TO AUDIO LOOSES | |
| What allowance does the committee make for | THE THE PERSON OF THE PERSON O | |
| the replacement of major repairs | RIOD / MONTH | |
| What would the committee do if the water source dried up? | DO NOT HADW , ALTHOUGH THERE'S TUGELA PINER 3KM FROM THE COMMUNITY | |

Field Checks (Please ensure that the data collected is sufficient to perform the following Calculations

| ltem | Explanation | Field Calculation |
|--------------------------------------|--|----------------------------------|
| Capital costs of construction | | |
| Construction date | | 1996 |
| ength and size of pipe network | Give estimates in 100m units. Size is important. | |
| Reservoirs | Size, material, and number is required | 4 RESERVOIRS |
| lo. of Consumers (households) | The population served by the system is also applicable | 204 |
| Existing Tariff | Include rate charged by the official water vendors | R7 p.m |
| Ave. number of paying consumers | | 202 |
| Ave. percentage of paying consumers* | , | at R7/moth, more than 100 % ? |
| Ave. income/expenditure ratio* | use 6 months records | 1.63 |
| ncome form new connections | probably available from accounts | Rizo |
| Total no. of pumping hours month* | use 6 months records ,estimate using information from operator | ? |
| Volume pumped* | use 6 months records | at 75 8/family/day = 454 kg/muth |
| Monthly cost of energy (R) | Important or get accounts no. and name and check with Eskom | R316 D'ESEL |
| Type of pumping system | Details of pump and its driving system be it diesel engine or electric motor | Diesel from booksle |
| Monthly Operation costs (R) | includes transport, energy, salaries, chemicals | R100 + R316 + R400 + 0. |
| Monthly maintenance costs (R) | includes repairs, and small item replacements | Klass. |

| ltem | Explanation | Field Calculation |
|------------------------------------|--|-------------------|
| Value of stock (R) | estimate | R500 |
| Taxes | | 1 |
| Salaries paid per month (R) | | R 400 |
| | Funds set aside for operation and maintenance | |
| Total expenditure per month* (R) | both recorded in accounts | R879. w |
| Unit cost of water (Rands / m3) | divide expenditure per month by volume of water produced per month | R1.92/kl. |

Relationship. with cours! - interest at the s stage

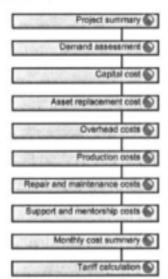
Spen Plemis

- · Os Enginery · Davids for Garage . Space Links .
- · Mica Hardwere pipe fitty

cest = 27. cu/ments onlittle worts 751/day = 2,25 tel/mill : price = R3.11/hl.

The WRC Cost and Tariff Model for Rural Water Schemes - sample run

1. Model flow chart





This model was developed by Partners in Development under contract to the Mvula Trust and the Water Research Commission. Comments, queries etc should WHC Model public_standpipe_demo.sts

| 2. Project summary | Colour key Essential informal Useful informal Calculated informal | | |
|--------------------|--|----------------------|--|
| Name | Den | Analysis nameinumber | Control of the Contro |

| Name | Demo | Analysis nameinumber | public standpise 1 |
|--|-----------------------------|--|--|
| Reference number Province | KwaZidu Natel | Analysis by | Contract of the Contract of th |
| Demography Population of project area umber of households in project area People per household institutions served | 1,300 | Data collection date | 0.00 |
| Commercial premises served Area served (km²) Population density (peopletum²) | | Water source Energy Source Water treatment type | Eshore |
| Institutional details | Name | Contact name | Contact number |
| Funding Agent | MET CONTROL PROPERTY OF THE | Out of the last of the last | Maria Control South |
| Implementing Agent | Manager Street | MICHIGAN STREET | MANAGEMENT OF THE PARTY OF |
| Project Engineer | SZELECKI STREET | 100011100000000000000000000000000000000 | TOTAL PROOF |
| Water Service Authority | STATE SECTION SECTION | No. of Concession, Name of Street, or other party of the Concession, Name of Street, or other pa | DANSEN STANFACTOR |
| Water Service Provider | ELEKSI SIRUMI | The second | SECTION STATES |
| | | | |

| 3 Demand Assessed | 100 | Collect New | | | | | | |
|--------------------------------|----------------------|--|--|--|--|--|--|---|
| d. Demand Assessed | | Executed information Useful information | STATE OF THE PARTY. | | | | | |
| Scannich fr. I ner damand | | | | | | | | |
| Correction type | | Parest sonarthon per person filters | Autorita in | Construction per construction per | Carsumpton per household (kimprits | fumber of corrections | Furnish of people beried | edi, usperson ed |
| Other chandouses with | Cambualdo | CONTRACTOR DE | Designation Con- | · · | | N. CONTRACTOR | | |
| 1 | Shamed the man | 100 | 910 | # 12 | 177 | 9 | 9.630 | (44) |
| Indiana describing | Contract of the last | The state of the s | The state of the s | The second second | annum in | | innumin | 1 |
| ١. | Constant Lines | | | | | | | |
| - 13 | Omerican) | | | 1 | anninininininininininininininininininin | 2 2 | | town mad but |
| | Memory | 100 000 | 101 | | | 18 01 88 | | |
| Varid tax | (hear) | 7.00 14.00 30.00 | 101 | | | 100 | | |
| Mouse connection | Denne | 000 1000 000 1000 000 1000 | 999 | | | 100 | | |
| Mumber of People Served | 873 | | | | | S transmished Colecidated aster | Total connumbration (strengths) 2. A meaning on the season budget of the Celebrates of the season (strengths) | A STATE OF THE PERSON NAMED IN COLUMN 1 |
| Scenario 2: Medium demand | edum demar | 9 | | | | - | - | 1 |
| Consection type | | Plannad consumption per person (idea) (default value) are | Account served of houses served by each correction | Construction per correction (altrophic | Consideration per heusehold dimensity | Manther of corrections | Marrier of people served | York consumption per connection tops (Altrophy) |
| Other (handpump, well) | | 200 | STATE OF THE PARTY | | | SEAME | | |
| Public standpipe | Unwand | 8.85 | Water Street, | 45.18 | 243 | STATE OF STREET | 6.520 | 2.896 |
| hydraulichal connection | throat. | | | STORES NAMES | | ONCORPORATION OF | | |
| Commercial commercion | Harand | | | SECSESSION OF THE PERSON OF TH | | | | |
| Bullen of Consumers in Curramy | office Burds | | | the ned high | | ton med high | | ton med hop. |
| | Unmelened | 23 | 50 | | | 100 | | |
| Yand tap | University | 19.00 | 100 | | | を確か | | |
| Heuste cormection | Unavend | 80.30 80.00 100.00 60.30 mmm 243.00 | 10 10 10 | | | が開発 | | |
| Munber of People Served | | | | | | Total consumption (it A transmission brees budge Calculated eaths also besses (it) | Total consensition (dimentity of transfer of the consensition of t | 40.05 |
| Scenario 3: High water demand | gh water den | Marc | | | | Volumes of high way | w separat Almarchi | 4334 |
| Commercialors type | | Darred conceptor person (Ide). (Milar reter an | According reaction of houses served by each correction | Companythen per cummertion (almostro | Consumption per hausehold (kimporth) | Namber of commercions | Marrier of people served | Total consumption per connection type (Altropetr) |
| Other (handpure), will) | Community | 90.00 | STATE OF STA | | | SANGE SANGE | | |
| Public standpips | - | 815 | A CO. C. | 62.08 | 145 | Man Linear | 6 530 | 1311 |
| Institutional commetten | | | | SANGERSON. | | 100000 | | |
| Commercial commercine | 1 | | | | | | | |
| Butten of Consumers In Consum | upper Berds | ж | The last set | Year med high | - Co. Com | tos ned top | | ton med high |
| | Unanand S | 18.00 | 10 10 10 | | | を対象 | | |
| Yaerd tags | Unerend | 15.00 | 10000 | | | | | |
| House commedies | Unwined | 40.00 mean 00.00 - | 10 10 10 | | | 語と | | |
| | ! | | | | | S harming consumption to the second state of the second sec | of communities (d'month) tenion bosses bodgehed for | 454 |
| Name of Penns Deven | | | | | | Volume of India water required oil | w worked distance | 4.000 |

| 4. Capital cost | | | Us | ital information and information sted information | 110002504 | Name Demio Anghala nametro oublic standoka 1 |
|---|---|---|---|---|--------------------------------------|---|
| Option 1: If only the Mechanical / Bectrice Option 2: If a more detailed breakdown of | | | | at Into Table 4. | 2 | |
| Note 1: Overhead costs, and all professiona Note 2: Engineering and construction overhe | fees incurred during the construct ead costs (P&Gs) to be distributed; | ion process must be pro-rate against the | e included here, v relevant captal i | with their accom | panying captal | oet so |
| TABLE 4.1 (complete only if more | detailed breakdown is not a | rvailable) | | Capital cost (用) | capital | TABLE 4.3 Loan / Grant split |
| Mechanical/Electrical works Civil works Additional costs | (BP, ISA, OTT/Support, P&G) | | | 100 | 0.0% 0.0% 0.0% | Loan finance Amount 0.0% Period of ican repayment (years) |
| TABLE 4.2 (preferable) | Unit | Quantity | Unit cost (R) | Capital cost (R) | % of total capital costs | Monthly payment R - |
| Mechanical/Electrical works Pump installation(s) Electrical controls Other | sum sum Eskom connection | | R 87,000.00 | R . | 5.5% 0.0% 4.9% | Grant finance Average inflation rate since commissioning Real annual interest rate (i.e. inflation discounted) 6.00% |
| Mechanical/Electrical works sub-total | Empli so - many | | | R 855,400 | 10.4% | Grant Date of grant/lears since grant Amount % of total capit Escalated grant vi Monthly cost of ca |
| Civil works | | | | | | Grant 1 55/10/2001 0.00 measurable 100.0% R 8.315,044 R 34,646 |
| Bulk system Water collection structures, (spring protection, borefole, wer, dam) Pumphouse | sum: | | R 38.475.00 | R 307,800 | 3.7% | Grant 2 Grant 3 0.0% R R R R Total monthly R 34,646 |
| Water treatment facility Bulk main | In Appearance Colored Colorador Colorador | 44.00 | W 62 674 72 | R 793,113 | 9.5% | |
| Distribution system | the Children | 15.00 | R 62.874.22 | H 793,113 | 9.5% | |
| Primary reservoirs Secondary reservoirs (Break pressure, balancing) | - | 400.00 150.00 | | R 364,800 R 239,400 | 4.4% 2.9% | |
| Primary reticulation Secondary reticulation | kn kn | | R 83.682.20 | | 13.2% 8.1% | |
| Meters Bulk meters Consumer meters | BUTT. | RECEIPED IN | CAYES | R : | 0.0% | |
| Connections Public tapstands Yard tanks Yard taps House connections Institutional connections Convended connections | BUTT BUTT BUTT BUTT | 70 | W 2,290.00 | R 159,800 R - R - R - R - | 1.9% 0.0% 0.0% 0.0% 0.0% | |
| Miscellaneous | | | | | | |
| Water office Other Cityil works sub total | | | R 91.200.00 | R 91,200 R 2,939,490 R 6,662,044 | 1.1% 35.4% 60.1% | |
| Additional costs | | | | 11 6.002.044 | 00.776 | |
| Feasibility Study and Business Plan (BP) | | | R 114.000.00 | R 114,000 | 1.4% | |
| Institutional & Social Development (ISD) | | | R 136,800.00 | R 136,800 | 1.6% | |
| Operation, Training & Transfer (OTT) | | | R \$35,800,00 | R 535,800 | 6.4% | |
| Additional costs sub total | | | | R 786,600 | 9.5% | |
| | Total capit | tal cost (sum of | above table) | R 8,315,044 | | |

| 5. Asset replacement cost | | | | Colour key | | | | | | | | Name | Demo |
|---|------------|--|---------------|--|----------|------------|----------|-----------|-------|-------------|----------|-------------------|-----------------|
| | | | | Essential information | 130 (60) | 0.9933000 | 1 | | | | | Analysis nameino. | public standpic |
| | | | | Useful information | | | | | | | | | |
| | | | | Calculated information | | | J | | | | | | |
| | | _ | | | | | | | | | | | |
| Average annual inflation rate: | | 7% | | | | | _ | | | | _ | | |
| | Original | | Years since | Design life of item | | eplacement | | Annual | | Monthly | | | |
| | capital co | t Commissioned | commissioning | (Default years given) | | inflation | | | | slacement o | | | |
| | (8) | _ | | | Adva | ded), (R) | - by | obset (R) | 685 | ntribution. | B) | | |
| From Table 4.1 | | | | | _ | | _ | | _ | | _ | | |
| i mechlelec costs (only shown if capital | | | | | | | | | | | | | |
| d reech/elec breakdown is not completed) | R | - CHE DOING | 0.00 | NAMES ASSESSED BY | R | | R | | R | | | | |
| Total civils costs (only shown if capital | | | | | | | | | | | ┑ | | |
| cost civilis breakdown is not completed) | R | - Ower | 0.00 | INTERPREDICTION OF A | R | | R | | R | | | | |
| | | | | | | | | | | | ┑ | | |
| From Table 4.2 | _ | _ | | | _ | | \vdash | | - | | \dashv | | |
| Mechanical/Electrical works | - | | | | | | - | | - | | - | | |
| Pump installation | R 456.0 | 0e-01 | 0.00 | CONTRACTOR OF TA | R | 456,000 | la | 45,600 | | | 800 | | |
| Electric controls | | 00101 | 0.00 | TOTAL CONT. 10 | R | | l R | 40.000 | in in | | | | |
| Other | | | 0.00 | 40 | R | 410,400 | R | 41,040 | R | 3. | 420 | | |
| | | | | | | | | | | | | | |
| IIvil works | | | | | | | | | | | | | |
| Bulk system | | | | | | | | | | | | | |
| Water collection structures, (spring | R 307,8 | OH-01 | 0.00 | 18 | R | 307,800 | R | 20,520 | R | 1, | 710 | | |
| protection, borehole, weir, damo | _ | CB45272172 | | STATE OF THE STATE | _ | | I. | | | | | | |
| Pumphouse | | 06-01 | 0.00 | CONTRACTOR OF THE | R | | 18 | | R | | - | | |
| Water treatment facility | | 009-01 | 0.00 | M | | | P. | | I.R. | | | | |
| Bulk main | R. 793,1 | C COLUMN TO SERVICE STATE OF THE PERSON NAMED IN | 0.00 | 30 | - | 793,113 | т. | 25,437 | м. | | 203 | | |
| Distribution system Primary reservoirs. | R 364.6 | 0801 | 0.00 | THE RESERVE THE PARTY AND | n | 384.800 | | 9,120 | | | 760 | | |
| Secondary reservoirs (Break pressure | | | 0.00 | SHEET BOOK | | 239,400 | | 5,985 | | | 100 | | |
| Primary reticulation network | | | 0.00 | THE RESERVE AND ADDRESS OF THE PARTY AND | | 1.007.183 | | 27,430 | | | 296 | | |
| Secondary resoulation network | | | 0.00 | | | 609,408 | | 16,736 | | | 195 | | |
| Meters | 1000.5 | - | 0.00 | | 14 | 450,500 | - | - Marie | - | _ | | | |
| Duff maters | D. | 0401 | 0.00 | STORTSHIP STORT AND | n | | R | | R | | | | |
| Consumer meters | | Oct-01 | 0.00 | | R | | R | | R | | | | |
| Connections | | | | | - | | _ | | - | | | | |
| Public tapatands | R 150.6 | N-BO COLOR | 0.00 | 20 | R | 159,600 | R | 7,980 | R. | | 165 | | |
| Yard tanks | | Out-off | 0.00 | 200 | R | | R | | R | | | | |
| Yard tape. | | . Do-01 | 0.00 | 20 | R | | R | | R | | | | |
| House connections | | 0.6-01 | 0.00 | 20 | R | | R | | R | | | | |

3,040 R 195,966 R

91,200 R 2,939,490 R Total asset replacement cost, monthly contribution: R

Yard taps R House connections R Institutional connections R

Water office R 91,200 Other R 2,939,490

Commercial corrections R

Miscellaneous

0.00

0.00

0.00

| 6. O | verhead costs | | | Name Demo |
|------|--|--|--|---------------------------------|
| | Colour key | | | Analysis name/no_public standol |
| | Essential information | MENTERS SERVICES | | |
| | Useful information | | | |
| | Calculated information | | | |
| ode | Cost component | Monthly cost | | |
| Ca | Office staff wages | anomality cost | | |
| - | Book-keeperladministrator | R 500.00 | | |
| | Other (fill in role and wage) | | | |
| | CHROSEROU SECUCIO DI LA DICINO CHINO. | V396809150225640233 | | |
| | LATER CONTROL OF THE | 15 PF 15 CO (25) A | | |
| _ | Office Ren | 2559.723 167877 | | |
| ОЬ | Field staff wages | | | |
| | Tariff collector | THE RESERVE OF THE PARTY. | | |
| | Standpipe minder | | | |
| | Motor made Operator | R 600.00 | | |
| | Other (fill in role and wage | N | | |
| | TO STATE OF THE PARTY OF THE PA | CHARLES BY MARKETON | | |
| | | STATE OF THE STATE OF | | |
| Qc. | Water committee allowances/expenses | DESCRIPTION OF SHAPE | | |
| Qd. | Security quant's venues Bank charges, telephone, taxif fares Stationery and computer consumables | AND DESCRIPTION OF THE PARTY OF | | |
| Oe | Bank charges, telephone, taxl fares | R 200,00 | | |
| Of | Stationery and computer consumables | | | |
| 绕 | Water Office electricity sosts Insurance premiums and ficence costs Vehicle costs | The state of the s | | |
| 쐈 | Vehicle costs | Section and Consultation Section 201 | | |
| 101 | Vehicle Icence/Insurance | OUTS RECOVERNO SET TO A | | |
| | Maintenance | | | |
| | Fue | | | |
| | Other | | | |
| QI. | Electricity basic cost and line rental (flat-rate of | R 1,419.36 | | |
| Q0 | Cost of Public or Private Connections Cost of Pre-Paid Tokens | CHARLES STREET | | |
| м. | [Cost of Pre-Pad Tokens | The second secon | | |
| | Total monthly overhead costs | R 2,819.36 | | |
| | Total monthly overhead costs | n 2,616.00 | | |
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| 7. Production | costs | | | | | | | | | | | | | Name | Demo |
|--------------------------------------|---|---------------------|-----------------|------------------------|--|-------------------------|-------------------------------|-------------------------|---|----------------|-------|-------------------|---------|------------|--------------------|
| | | | | | | | | | | | | | Analysi | s name/no. | public standpipe 1 |
| | | | Code | Monthly water product | CostNI, (R) | Low | Cost, (R) | Medium | Cost, (R) | High demand | Cost. | (R) | | | |
| Colour key | | 1 | Po | Bulk water buy-in cost | AD 200 (200 (200 (200 (200 (200 (200 (200 | 2,027 | R - | 4.054 | R . | 6,082 | R | _ | | | |
| Essential information | 500000000000000000000000000000000000000 | 1 | Po | Treatment cost | THE RESERVE AND ADDRESS OF THE PERSON NAMED IN | 2,027 | | 4,054 | | 6,082 | | | | | |
| Useful information | | 1 | Pe | Pump cost: | | | | | | | | | | | |
| Calculated information | | J | | Purro number 2 | A STATE OF THE PARTY OF THE PAR | 2,027 2,027 | R 60 | 4,054 4,054 | R 119 | 6,082 6,082 | R | 179 | | | |
| Unless the energian known, use the e | | | 1 | 3 | | 2,027 2,027 2,027 | R 60 | 4,054 4,054 4,054 | R 119 | | R | 179 179 179 | | | |
| | | e oues emones | Pl | Labour | V 100-5-00-00-00-00-00-00-00-00-00-00-00-00 | 2,027 | | 4.054 | | 6,082 | | 17.0 | | | |
| | | | | | otal water produ | uction costs | R 298 | | R 597 | | | 895 | | | |
| Energy Demand | | and hilling of also | | | | atalala Casta | _ | | and Santa | | | | | | |
| Assume 0.35 litres of | | | ctricity produ | ced. | | ctricity Costs | | | lesel Costs | | | | | | |
| and the power input e | quation is used - | | | | kWhy ceiling for block 1 | | Unit cost: rate for block: | | Rif | | | | | | |
| | | | | | 600 | | | B | 3.50 | | | | | | |
| The energy therefore | P(kW) = (9.8 *) | | im_isec]) , bri | mp empercy | 900 | A | R 0.27 | R | 2.00 | | | | | | |
| tue events merancia | E (8Why) = P (8) | | | | | | | | | | | | | | |
| | E terrent - 1 ter | | | | | | | | | | | | | | |
| | afer demand (M): | 2,027 | | | | | | | | | 1 | | | | |
| Pump number | Pump type | Pump flow rate | | Pumping head (m) | Pump efficiency | | Pumping | kWhrs | Litres of diesel | Monthly | l | | | | |
| | (electric / diesel | (litres/sec) | demand | | (default value) | required (kW) | | required | required | energy cost | 1 | | | | |
| | /other) | | pumped | 183.53 | 2.43 | **** | required | | | per pump (R) | | | | | |
| | electric | | 29.0% | 100.00 | 0.87 | 33.64 33.64 | 4.90 | 164.73 164.73 | | R 60 | l . | | | | |
| | electric electric | | 20.0% | 100.00 | 0.67 | 33.64 | 4.90 | | Not a diesel pump | R 60 | l | | | | |
| | electric | | 20.0% | 100.00 | 0.67 | 33.64 | 4.90 | | Not a diesel pump | R 60 | | | | | |
| | electric | | 20.0% | 100.00 | 0.67 | 33.64 | 4.90 | | Not a diesel pump | R 60 | | | | | |
| | | | | | | | | | nthly energy cost (R) | | 1 | | | | |
| | | | | | | | | | Cost per kl (R) | R 0.15 |] | | | | |
| 11-6 | -t f (0.0) | 1051 | _ | | | | | | | | 1 | | | | |
| Pump number | Pump type | Pump flow rate | | Pumping head (m) | Pump efficiency | Power input | Pumping | kWhrs | Litres of diesel | Monthly | 1 | | | | |
| Pump number | refectric / diesel | | demand | r unprigness (m) | (default value) | required (kW) | hours | required | required | energy cost | | | | | |
| | / other) | | pumped | | | | required | | | per pump (Rt) | | | | | |
| | electric | 23.00 | 20.0% | 100.00 | 0.67 | 33.84 | 9.79 | 329.46 | Not a diesel pump | R 119 | 1 | | | | |
| | electric | | 20.0% | 100.00 | 0.67 | 33.64 | 9.79 | 329.46 | Not a diesel pump | R 119 | l | | | | |
| 1 | electric | | 29.0% | 100.00 | 0.67 | 33.64 | 9.79 | | Not a diesel pump | R 119 | l | | | | |
| | electric | 23.00 | 20.0% | 100.00 | 0.67 | 33.64 33.64 | 9.79 | | Not a diesel pump | R 119 | l | | | | |
| | electric | 23.00 | 20.0% | 100.00 | 0.87 | 33,64 | 9.79 | | Not a diesel pump orthly energy cost (R) | | 1 | | | | |
| | | | | | | | | rotal mo | Cost per kl (R) | | 1 | | | | |
| | | | | | | | | | out he will | 11. 4.4 | , | | | | |
| High w | afer demand (kf); | 6,082 | | | | | | | | | 1 | | | | |
| Pump number | | Pump flow rate | | Pumping head (m) | Pump efficiency | | Pumping | kWhrs | Litres of diesel | Monthly | l | | | | |
| | (electric / diesel | (litres/sec) | demand | | (default value) | required (kW) | hours | required | required | energy cost | | | | | |
| | /other) | | pumped | | | | required | | | per pump (R) | 1 | | | | |
| 1 | electric | | 20.0% | 100.00 | 0.67 | 33.84 | 14.69 | | Not a diesel pump | R 179 | | | | | |
| | electric | | 20.0% | 100.00 100.00 | 0.67 | 33.84 33.84 | 14.69 | | Not a diesel oumo Not a diesel oumo | R 179 R 179 | l | | | | |
| | electric electric | | 20.0% | 100.00 | 0.67 | 33.64 | 14.69 | | Not a diesel pump | R 179 | | | | | |
| | electric | | 20.0% | 100.00 | 0.67 | 33.64 | 14.69 | | Not a diesel pump | R 179 | | | | | |
| | 4-1015 | 2000 | 1000 | 199.00 | 2.81 | 32.01 | 14.69 | | nthly energy cost (R) | | 1 | | | | |
| | | | | | | | | | Cost per kl (R) | | 1 | | | | |
| I | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | |

| pair and maintenance costs Colour key | | | | | | | | _ | | | nis name/no | public s | entoipe ! | L |
|---|--|--|---|---|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | Tou | | |
| Uşekil intorrulor | | | System component requiring maintenance and repair | or | specialist | | | | Tools | | | | Total | × |
| Calculated information | | | Mechanical Electrical works | | | | | | | | | | | Ξ |
| | | | | 200 | 1,200,00 | R. | 2,400.00 | In. | 1,200.00 | Mili | 1,200.00 | 23635 | | a |
| | information | | Electrical controls | 230 | | 18. | | 45 | | 935 | | 1-5500 S | | ı |
| | | | Other | W.C | 93000 | 15 | 402 | 12 | PERCEN | 204 | 25 1920 | 17127788 | R | _ |
| | Month | ly cost | | | | l. | | l. | | | | | | |
| | w assess | | Mechanical/Electrical works sub total | R | 1,200.00 | н | 2,400.00 | ļñ. | 1,200.00 | н | 1,200.00 | н . | R 4,80 | = |
| | W 600 TO | | Cost per month | R | 100 00 | la | 200.00 | l _R | 100.00 | R | 100.00 | R . | R 40 | ю |
| Other | 725 | | Cost per moren | - | 100 00 | + | - | ۳ | 150.00 | - | 100.00 | - | 1 | Ē |
| Additional casual or specialist labour | V25255 | R 100.00 | | | | _ | | L | | | | | | _ |
| | | | Civil works | | | | | F | | | | | | Ξ |
| | | m 200 00 | | _ | | 1 | | 1. | | _ | of management of | | | |
| Materials and spare ports | NO STATE | H 200:00 | | | | 122 | | и | | 1500 | | 100,530 | l" | |
| Tools | HOUSE | R 100.00 | Pumphouse | 1300 | | ю | | 19 | | 1500 | | 18230 | R | |
| Other | 74 E E E | | Water treatment facility | 10953 | | 188 | | 19 | | 100 | | 1000000 | | |
| | - | | | 822 | | 100 | | ю | | 1000 | | (C220) | | |
| | 200 | R 100.00 | | - | and the same of th | - | - | • | | _ | | _ | - | f |
| Automated dispensing units | | | Primary reservoir | 4000 | PERSONAL PROPERTY. | de: | 08945 | łо | 901/05/ | 1900 | 15790507 | 106/5250 | R | , |
| Associated other costs | 115000 | R - | | | | 167 | | в | | F-022 | | 100000000000000000000000000000000000000 | R | 1 |
| Son Coassal and calculated others, respectively | 0 000 | B 500 | | | | 12 | | ю | | 100 | | 122 E.C. | | |
| | 11 000 | | | 1600 | | 160 | | и | | 1300 | | 10790 | | |
| Total moretin reper and manuscratics could | | 1.000.00 | | 1100 | | 100 | | 16 | | 1933 | | 22227 | R | |
| | | | Meters | | | | | Е | | | | | | Ī |
| | | | | (38) | | 150 | | ю | | 735 | | 30075 | | 1 |
| | | | Connections | - | - | - | - | ۰ | | - | AND RESIDENCE | and the later of t | - | - |
| | | | Public tapatand | 1000 | WEST STONE | łю | NOTIFIED TO | фo | CONTRA | 7309 | CEPEBUS | 500,000 | R I | |
| | | | Yard tank | 1200 | | 133 | | ю | | 180 | | 770900 | | |
| | | | | 23.84 | | 190 | | ю | | 100 | | 131439SS | | |
| | | | | 9525 | | 100 | | ю | | 130% | | 15000000 | | |
| | | | Commercial connection plumbing | 1000 | | 123 | PROT | ш | 1965 | 1457 | 100000 | 200,7000 | 8 | |
| | | | Miscellaneous | | | | | L | | | | | | |
| | | | | 725 | | 100 | | 18 | | 1993 | | (F) (F) | | |
| | | | | - | | Τ. | _ | T. | | - | | | | 7 |
| | | | Civil works sub total | R | | R | | P | | R | | R - | R | |
| | | | Cost per month | R | | B | | l R | | R | | R . | R | |
| | | | con per mone | - | | + 111 | _ | +- | | - | | | _ | - |
| | Useful information Calculated information Note: Fill in "Maintenance Cost Table" if more detailed in available for code's Fil. Rm, Rt and Rx. Cust correponent Local labour costs Plumber General maintenance Other Additional casual or specialist labour Malenals costs Malenals and spare ports Tools Obter Coulsourced work Filant costs Secotic lateraport costs Associated other costs Son of market and optioned colorus, respectively | Note: Fill in "Maintenance Cost Table" if more detailed information is available for code's Rt. Rm. Rt and Rx. Cost component Local labour costs Plumber General maintenance Cities Additional casual or specialist labour Materials costs Materials and spare ports Tools Other Codes Co | Calculated information Note: Fill in "Maintenance Cost Table" if more detailed information in available for code's Rt. Rm. Rt and Rt. Cost component Monthly cost Local labour costs Plumber General maintenance Cities Additional casual or specialist labour Materials costs Materials and spare ports Tools Cities A 100.00 A 100.00 Chilsourced work Plant costs R 100.00 A 100.00 Chilsourced work Plant costs R 100.00 Anyonisted depending units Associated other costs Sum of mareaul and calculated otherse, respectively R 800.00 R 500 | System component requiring maintenance and regalit Mechanical@Sectrical works | Useful information Calculated information Note: Fit in "Maintenance Cost Table" if more detailed information in available for cooles RI. Ren. RI and Ris. Cost correponent Local labour costs Plumbur General maintenance Diser Additional costs Materials and spare ports Tools Characterial more respectively. R 100.00 Ansiented dispersion pressure. Secondary resources clearing. Primary resources clearing. R 100.00 Materia. Materia. Materia. Materia. System corrical works. R 200.00 R 200.00 Cost per month. R | System component requiring maintenance and repair tabour contains System component requiring maintenance and repair tabour specialist tabour Maintenance Cost Table* if more detailed information Butter Butter | System component requiring maintenance and regular or specialist apour specialist subsect of specialist specialists and appear or specialists of specialists speci | Useful information Calculated information Note: Fill in "Maintenance Cost Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table" if more detailed information in available for codes RT Rev. Table Rev. Tab | Useful information Calculated information Calculated information Calculated information MachanicalElectrical works Pump original machanical controls is available for orders PI, Rio, RI and Rix. Cost component Cost across PI, Rio, RI and Rix. Cost stoor costs Plumber General maniferance Cost Ri Rio, RI and Rix. Cost stoor costs Plumber General maniferance Cost Ri Rio, RI and Rix. Cost per month Additional casual or specialist labour R 100.00 Cost per month R 100.00 Chief costs R 100.00 Chief works sub total R 100.00 Cost per month R 100.00 Civil works Bulk system Water costscience specialist Bulk system Water costscience specialist R 100.00 Civil works Civil works Bulk system Water costscience specialist Bulk system Water costscience specialist Bulk system Water costscience specialist Bulk system Civil works Bulk system Water costscience specialist Bulk system Water costscience specialist Bulk system Fruedpoore Water beatment facility cleaning protection, borshole, were, dans Principoore Water costscience specialist Bulk system Water costscience specialist Bulk system Principoore Water costscience specialist Bulk system Water costscience specialist Bulk system Principoore Water costscience specialist Bulk system Bulk system Principoore Water costscience specialist Bulk system Bulk system Bulk system Principoore Water costscience specialist Bulk system Bulk system Bulk system Bulk system Bulk sys | Useful information Calculated information Calculated information Calculated information Calculated information Calculated information Reserved File in "Maintenance Cost Table" if more detailed information is available for orders Fil. Res. Rt and Re. Cost componend Cost Table "Reserved detailed information is available for orders Fil. Res. Rt and Re. Cost componend Cost Table "Reserved detailed information Cost of table "Reserved detailed information Reserved works such total Reserved detailed information Additional casual or specialist labour Reserved detailed other costs Materials costs Materials costs Materials and sparre parts Cost per month Reserved detailed other costs Built system Water observed search Water beatwerd built costs Civil works Civil works Civil works Civil works Civil works Distribution system Beacondary reserved (carring Primary reserved Beacondary reserved (carring Primary reserved detailed Reserved clearing Primary resorved clearing Primary resorve | Dysfild information Cabustation Cabust | System component requiring marketenance and regals consumers are applicable for content in available for content in the content in available for content in available | System component requiring maintenance can regard to provide the research of the second provided information or available for code's R1 No. 17 and R1. Machanical Electrical works R1 100 00 R1 | System corroponent and requiring matrimenance and regular or specialist space parts below transport costs. MechanicalElectrical works Pumb ergeneiroscit. MechanicalElectrical works Pumb ergeneiroscit. Buildour cerebs MechanicalElectrical works auth total R 1200 00 R 2,400 00 R 1,200 00 R 1 |

| Su | pport and mentorship | Colour key | | | | | | | | | | Name | Demo |
|----------|--|--|----------|----------|-----------|-----|---|---------|----------|-------------|---|------------------|--------------------|
| | | Essential inform | ation | DIROG | 69446294 | | | | | | ᆫ | Analysis name/no | public standpipe 1 |
| | | Useful inform Calculated inform | ation () | 00142000 | 1880920-1 | | | | | | | | |
| | | | and I | | | | | | | | _ | | |
| 5b | Cost component Bulk Supply (Net Cost) | Hours | - | Hour | ty rate | R - | Material cost | Transpo | ort cost | Other | R | Monthly cost | |
| Se | Environmental Managament | 500 TO 100 TO 10 | 169 | | 1435 | R . | TO CHESTER | 12995 | 2088 | | R | | |
| 91 | Facilitation | 2017 PA TOTAL | 980 | | | R - | 435000000000000000000000000000000000000 | 034599 | 9200 | | R | | |
| Si | Implementing Agents' costs | 100000000000000000000000000000000000000 | 27.1 | | 20.355 | R - | | 23557 | 9005 | | R | | |
| ip | Project Management | 485000000000000000000000000000000000000 | 9 1 | R | 250.00 | | CONTRACTOR | R | 300,00 | | R | 2.550.00 | |
| Sq. | Water Quality Monitoring Programme | (A. C. | 18 1 | R | 150.00 | | CHIPPENSON. | R | 500,00 | | R | 3.200.00 | |
| Sr St | Reticulation Supply Training | | 25 | | | R . | THE STATE OF | MARKET | 20000 | | R | | |
| St. | Iranng | design of the last | | | | n . | | 200000 | - | - | " | | |
| | | | | | | | Total monthly | support | and ment | orship cost | R | 5,750 | |
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| 10. Monthly cost summary | Colour key | | | | | | | | | Name | Demo |
|---|---|----------------------|------------------------|----------------|-----------------------|-------------|--------------|-----------------------|--|-------------------|------------------------------|
| , | Essential informati Useful informati Calculated informati | on thinks | | | | | | | | Analysis namelno. | public standpipe |
| | | | | | | | | | | 1 | |
| ost component | Cost | Cost met Water Se | | Service | National | Т | Other | Total costs not being | Comments | 1 | |
| | - | Provid | | thority | Governmen | vt | | covered | | J | |
| apital costs | | | | | | | | | | 1 | |
| icen finance for project extension/uporade Cost of grant finance | R 34.64 | 9225 | | | R 34.64 | 4 13 | | R R | All costs are being covered All costs are being covered | 1 | |
| sset replacement costs | | | | | - | | | | | 1 | |
| arband costs | R 33.33 | T RESIDENCE | 8,000 R | 25,321 | AND DESIGNATION. | 4 | 19000 | R . | All costs are being covered | 1 | |
| verhead costs | R 2.81 | N MONTH | 2,819 | TRANSPORTED | NACES OF THE PARTY OF | - | (2)((0)(0) | R . | All costs are being covered | 4 | |
| oduction costs | | | | | | | | | | 1 | |
| Low demand Medium demand | | e Million | 298 | P. Cale | 100000 | 2 6 | 37/55 | R R | All costs are being covered | 1 | |
| High demand | | | 997 995 | Sec. 1 | \$19794.5 | ПB | 2000 | R | All costs are being covered All costs are being covered | 1 | |
| spair and maintenance costs | | - | 1 244 | Carlotte Marie | and the same of | - | CONTRACTOR A | R . | | | |
| upport and mentorship costs | R 1.30 | O RESIDENCE | 1,300 | | NAME AND ADDRESS OF | - | | н . | All costs are being covered | 1 | |
| | R 5.75 | O PERSONAL PROPERTY. | STATE OF THE PERSON | 3,750 | CHRISTIAN | 4 | LINE DA | R . | All costs are being covered | 1 | |
| otal costs | | | | | | | | | | | |
| ow demand | | _ | _ | | | + | | 1 | | | |
| Total cost | | | 12,417 R | 31,071 | | | | l | | | |
| CostAl Average cost/household | R 53.5 | 6 R | 8.58 R 10.43 R | 21.46 | R 23.9 | 3 R | | l | | | |
| edium demand | - | | | 40.11 | | Т | | 1 | | | |
| Total cost Cost/M | | 14 R 1 | 12,716 R 4.39 R | 31,071 | | 6 R | | l | | | |
| Average cost/household | | n R | 10.69 R | 26.11 | R 29.1 | 1 R | | | | | |
| igh demand | | | | | | | | 1 | | | |
| Total cost CostM | | 2 R 1 | 3,014 R 3.00 R | 31,071 7.15 | R 7.9 | 6 R | | 1 | | | |
| Average costhousehold | | 6 R | 10.94 R | 26.11 | R 29.1 | 1 R | | J | | | |
| Cost p | er Kilolitre Supplied | | | | | | | | Monthly Cost per Househo | old | |
| R 60 00 . | | | | | | | | R 70 00 | | | |
| _ | | | | | | | | | | | |
| R 50.00 | | | | | | | | R 60.00 | | | ■ Cost |
| | | | ■ Cost | | | | | R 50.00 | | | |
| R 40.00 | | | ■ Vister Serv | | | | | B 40.00 | | | ■ Water Service |
| ¥ R3000 | | | Provider | | | | 1 | R 40.00 | | | Provider |
| 3 | | | D'Water Serv | ce | | | 4 | R 30.00 | | | O Water Service Authority |
| R 20:00 | _ | | Authority | | | | | R 20.00 | | | B National |
| R 10:00 | | | Bhational Governmen | | | | | | | | Government |
| | 19 | | ■ Other | | | | | R 10.00 | | | ■ Other |
| R: | | - 10 m | | | | | | R- | | | |
| Low demand M | ledium demand H | igh demand | | | | | | Low dema | end Medium demand | High demand | |

WRC RURAL WATER SUPPLY COST AND TARIFF MODEL, VERSION A1, 21 June 2002. This model was developed by Partners in Development under contract to the Mivula Trust and the WRC. Comments and queries etc are invited. E-mail: pidpmb@liafrica.com

| 11. Tariff calculation | | | | | | | | | | | | | | N | lame | Demo |
|--|-------------------------|-----------------|----------------|----------------|--------------|--------------|---|--------------------|-------|------------|---------------------------------------|-----------|--------------|---------|------------|--|
| | | | Block tar | iff | | | | 1 | | | | | | Analysk | s nameino. | public standpipe 1 |
| Colour key | |] | ld used | | | | Commercia | | | | | | | | | |
| Essential information | Property and the Parket | 8 | from | to | rate (RAd) | rate (R.M) | rate (Fold | 4 | | | | | | | | |
| Useful Information Calculated information | 1000004 | 9 | - white with 0 | 266534 | 966185 | 169999 | (58°96) | 1 | | | | | | | | |
| Carculated intornvatori | | J | | | | 300 | 1955 | 1 | | | | | | | | |
| | | | | - | | | | _ | _ | | | _ | | | | Economio |
| | Handp | ump, Well | Public | tapstand | Institutiona | l connection | | d connection | | Yard | tank | Ya | ed tap | House | connection | Analysis |
| | Communit | y Family | Metered | Unmetered | Metered | Unmetered | Metered | Unmetered | N. | Aetered | Unmetered | Metered | Unmetered | Metered | Unmetered | (WSP costs only) |
| Tariff | | | | | | | | | | | | | | | | ALCOHOLD REPORTED IN |
| Flat rate (Rifhousehold,connection) | | | R 15.00 | | SESSA | | 159450 | | 1000 | | · · · · · · · · · · · · · · · · · · · | 55000 | | 25000 | | 450000000000 |
| Volumetric rate(Rtfd) | | | 2000 | 111111111 | 1010000 | 111111111 | 1589500 | 111111111 | 100 | | VIIIIIII | 4010000 | VIIIIIII | 319231 | MILLIAM | 472533333332 |
| % bad debt assumed | 2000 DO | Secolar Secolar | 33.0% | MANAGED STREET | BECKS SER | 2012/2015 | 10000000 | PERSONAL PROPERTY. | 2000 | CONTRACTOR | STATISTICS. | 100000000 | A PRODUCTION | ESCOUR | 10000000 | Bertham Committee |
| Low demand scenario | _ | - | 70 | _ | _ | _ | | | - | | - | _ | | | | Low demand |
| Total Number of Connections verage Number of Households per Connection | - | - | 17 | | mmin | mmi | mmi | mmin | - | _ | 1 : | | | - | - | INCOME |
| Average consumption (kithousehold | | - | - " | - | YIIIIIIIII | 4111111111 | | | 1 | _ | ' | <u> </u> | | - | ' | R 11,960 |
| kl/connection in the case of institutional and | | | l | | | | l | | | | | l | | l | | EXPENDITURE |
| commercial connections | | | 1.22 | | | | | | | | | | | | | R 12,417 |
| Total income from consumers (R) | | | | | | | | | low | R | | R | | R | | PROFIT / LOSS |
| | l | | 1 | | | | | | med | R | | R . | - | R | 4 | |
| | R | . R . | R 11,960 | R . | R . | R - | R | R . | high | R | - R - | R . | R . | R . | н . | R -458 |
| | | | | | | | | | Total | R | | R . | | R | | THE REAL PROPERTY. |
| Medium demand scenario | _ | | | | _ | _ | _ | | - | | _ | _ | | _ | | Medium |
| Number of Connections | _ | 1 | 70 | | | | | | | | | | | | Τ. | INCOME |
| verage Number of Households per Connection | | | 17 | | 01111111 | וווווווו | ווווווווווווווווווווווווווווווווווווווו | ,,,,,,,,,, | | | 1 1 | 1 | 1 | , | 1 | R 11,960 |
| Average consumption (ki/household, | | _ | - | | annin a | uman | | <i>annun</i> | - | | - | | _ | | - | |
| kl/connection in the case of institutional and | | | 1 | | | | l | | | | | l | | l | | EXPENDITURE |
| commercial connections | ١. | | 2.43 | | | | | | | | | | | | | R 12,716 |
| Total income from consumers (R) | | | | | | | | | low | R | | R . | | R . | | PROFIT / LOSS |
| | l | 1 | 1 | | | | l | | med | R | | R . | | R . | - | |
| | R | . R . | R 11,960 | R - | R - | R - | R . | R . | high | R | - R - | R . | R - | R . | R - | R -757 |
| | | | | | | | | | Total | R | | R . | | R . | | STATE OF THE PARTY |
| High demand scenario | _ | | _ | | _ | _ | _ | | | | _ | | | | _ | High demand |
| Number of Connections | | | 70 | | | | _ | | - | | | _ | | | Т. | INCOME |
| verage Number of Households per Connection | | | 17 | | viiiiiiiii | מחווווו | ommin | ,,,,,,,,,,, | | | 1 1 | - 1 | 1 | 1 | 1 | R 11,960 |
| Average consumption (ki/household, | | - | | _ | yaaaaaa | | | ummin | - | - | - | <u> </u> | - | | - | 11,000 |
| killoonnection in the case of institutional and commercial connections: | 1 | | 3.65 | | | | ١. | | | | | ١ | 100000 | ١. | | R 13,014 |
| Total income from consumers (R) | | | 2.03 | | | | | | low | R | | R | | R | | PROFIT / LOSS |
| | | | | | | | l | | med | R | | R . | | R | | PROFIT / LOSS |
| | R | R . | R 11,960 | p . | R . | R . | R . | R . | high | R | . 0 | R . | R . | R | R . | R -1.065 |
| | - | 1.4 | 11,500 | 111 | - | | - | | Total | | | R | | 0 | | A -1,005 |
| | | | | | | _ | | | 1008 | " | | " ' | | M . | | MINISTER SPECIFIC |

WRC RURAL WATER SUPPLY COST AND TARIFF MODEL, VERSION A1, 21 June 2002

This model was developed by Partners in Development under contract to the Mivula Trust and the WRC. Comments and gueries etc are invited.

E-mail: pidpmb@iafrica.com

Summarised data from operating community-based rural water projects

| PROJECT SUMM Jakopung 1.1310 pumalanga 1/1998 orehole one olar & Diesel backup of taps 3 stion R 90,000.00 R 460,000.00 ance costs / month | Head p | Pump of Hrs/month: | usage data Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | |
|--|---|---|--|-----------------------------------|
| n.1.1310 pumalanga 1/1998 porehole one olar & Diesel backup of taps 3 stion R 90,000.00 R 460,000.00 | Head p | Population: olds served: ement type: Pump of Hrs/month: Kl/month: oumped (m): Other notes: | 2000 175 Villages usage data Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| pumalanga 1/1998 orehole one olar & Diesel backup of taps 3 3% stion R 90,000.00 R 460,000.00 | Head p | Pump of Hrs/month: KI/month: Sumped (m): Other notes: | usage data Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| orehole one olar & Diesel backup of taps 3 Stion R 90,000.00 R 460,000.00 | Head p | Pump of Hrs/month: Kl/month: bumped (m): Other notes: | usage data Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| one olar & Diesel backup of taps 3 Stion R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | Hrs/month: Kl/month: bumped (m): Other notes: e (R/month): r rate (R/kl): | Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| one olar & Diesel backup of taps 3 Stion R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | Hrs/month: Kl/month: bumped (m): Other notes: e (R/month): r rate (R/kl): | Solar = 196, 1120 Res.1 = 130, Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| olar & Diesel backup of taps 3 3% stion R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | KI/month: bumped (m): Other notes: e (R/month): r rate (R/kI): | 1120 Res.1 = 130 Balfour 3.7kW DC | , Res.2 = 85 Lister TS1 6kW |
| of taps 3 3% Etion R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | oumped (m): Other notes: e (R/month): r rate (R/kl): | Res.1 = 130, Balfour 3.7kW DC | Lister TS1 6kW |
| 8% Etion R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | Other notes: e (R/month): r rate (R/kl): | Balfour 3.7kW DC | Lister TS1 6kW |
| R 90,000.00 R 460,000.00 | Flat-rate Mete Pre | e (R/month): r rate (R/kl): | 3.7kW DC | 6kW |
| R 90,000.00 R 460,000.00 | Mete Pre | r rate (R/kl): | | R 10.00 |
| R 90,000.00 R 460,000.00 | Mete Pre | r rate (R/kl): | | R 10.00 |
| R 90,000.00 R 460,000.00 | Pre | | | |
| R 90,000.00 R 460,000.00 | Cos | | | |
| R 90,000.00 R 460,000.00 | Cos | | | |
| MILLON COMPRESSOR STUDY OF THE PARTY | Cos | Total: | | R 550,000.00 |
| ance costs / month | | t per capita: | | R 275.00 |
| | | | | |
| R 500.00 | | | ly wages | |
| | | | | R 700.00 |
| | | | | R 10.00 |
| B 22.00 | | | | |
| | Treasurer: | | | R 10.00 |
| | | | | 10.00 |
| 11 100.00 | | | | |
| L | | | | |
| | Notes: | | | |
| | | | | |
| R 632.00 | | Total: | | R 720.00 |
| | Pater History | | | |
| the state of the s | on. | | I Am | ount |
| Безагра | OH | | 70.0 | R 0.00 |
| avings & stock | | | | R 6,000.00 |
| six months | | 1000 | | |
| Income | | | Expenditure | |
| | | | | R 1,272.08 |
| | | | | R 759.99 |
| | | | | R 1,297.90 R 710.00 |
| | | | R 710. R 1,278. | |
| | | | | R 940.00 |
| | | | | R 1,043.11 |
| s received per month | | | | |
| | Subsidy typ | е | Am | ount |
| | | | | R 0.00 |
| | | | | R 0.00 |
| SOUTH PRODUCED IN THE PROPERTY OF THE PARTY | | | | K 0.00 |
| 8 + 252 52 | | | | |
| R 1,352.00 | | | | f water R 1.21 |
| D 0 69 | | - | | R 1.21 |
| | R 22.00 R 10.00 R 100.00 R 632.00 S Description avings & stock six months Income R R R R R R R R R R R R R | R 22.00 R 100.00 R 100.00 R 100.00 Store Plumber memory Notes: R 632.00 S Description R 1,320.00 R 880.00 R 1,440.00 R 1,080.00 R 1,080.00 R 1,330.00 R 950.00 R 1,166.67 S received per month body R 1,352.00 Aver Exclude | R 22.00 R 1,320.00 R 1,330.00 R 1,166.67 Streeded per month | Operator / foreman : |

| WRC RURAL V | WATER SUPPLY FINA PROJECT SUMM | St. Act - (Capper) . 3 | | G PROJECT |
|--|--|---|---|--------------------------|
| Reference number: Province: Kv Date of commissioning: 06 | TORRIGHT THURSDAY | House | Population: holds served: ttlement type: | 4900 |
| Technical data | | ad mari | BUT OF AS | |
| Water source: Da | am on Mhlali River | | Pump u | sage data |
| | odium Hypo. & rapid sand | | Hrs/month: | |
| Energy type: Es | | | KI/month: | |
| Number | of taps | Head | pumped (m): | |
| Public: 0 | | | | 2* 22kW + 2* 11.5kW + |
| Private: 28 | 5 | | 4 3.75KVV p | oumps (20 l/s) |
| Tariff data | 250.00 | First | to (Discosth) | D 20 00 |
| Yard connection fee: R Average % non payment: 68 | | Met | te (R/month): er rate (R/kl): re-paid (R/kl): | R 30.00 |
| Capital costs of construc | tion | 410000 | | |
| Mechanical / electrical: | R 400,000.00 | | Total: | R 4,400,000.00 |
| Civil works: | R 4,000,000.00 | Co | st per capita: | R 897.96 |
| Operational and maintena | ance costs / month | | rahi Proj | |
| Bulk purchase / Energy: | R 3,893.00 | | Month | ly wages |
| Water treatment: | R 80.00 | Operat | or / foreman : | R 280.00 |
| Spare parts: | | | ariff collector: | R 360.00 |
| Administration: | | | pipe minders: | |
| Pump servicing: | R 70.00 | Committ | ee members: | |
| Civil works repair: | R 700.00 | C | Treasurer: | |
| Transport cost: Replacement / emergency | R 150.00 | Store manager: Plumber / general maintenance: | | |
| fund contribution: | | | | R 360.00 |
| Costs of any other | | Notes: | Tigil Heriotice. | 11 000.00 |
| external support: Other: | | | | |
| Total: | R 4,893.00 | | Total: | R 1,000.00 |
| Cash assets and liabilitie | s | | | |
| | Descripti | on | | Amount |
| Unpaid bills | | | | R 0.00 |
| | or meter purchases & stock | | | R 33,500.00 |
| Finance data for the last | | | | |
| Month | Income | 4 705 00 | | Expenditure |
| 1 2 | | 4,735.00 | | R 5,935.00 |
| 2 3 | | 9,173.73 | | R 5,513.40 R 9,398.01 |
| 4 | | 5,604.00 | | R 9,253.00 |
| 5 | | 5,601.24 | | R 6,490.11 |
| 6 | | 9,209.00 | | R 7,028.74 |
| Average | R | 6,459.00 | | R 7,269.71 |
| Typical external subsidie | s received per month | 000 | 53/14/01/03 | |
| Subsidy granting | The state of the s | Subsidy ty | pe | Amount |
| | | | | R 0.00 |
| | 4 | | | R 0.00 |
| | | | | R 0.00 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 5,893.00 | | | y unit cost of water |
| Operational cost | | | ding subsidy: | |
| per capita / month: | R 1.20 | including | all subsidies: | R 1.40 |

| WRC RURAL WAT | PROJECT SUMM | | The second state of the second second second | G PROJECT | |
|---|-------------------------------|---|---|-----------------------|--|
| Name: Emay | | | ssment date: | 02/02/1999 | |
| Reference number: DWAF | | Population: | | | |
| Province: KwaZul | | House | holds served: | | |
| Date of commissioning: Jun-98 | Date of commissioning: Jun-98 | | | Dispersed Village | |
| Technical data | | | | | |
| Water source: Bulk wa | iter | | Pump u | sage data | |
| Treatment type: n/a | | | Hrs/month: | | |
| Energy type: n/a | | | KI/month: | | |
| Number of tag |)\$ | Head | pumped (m): | | |
| Public: 0 | | | Other notes: | pumped shared with | |
| Private: 22 | | | | Montebello | |
| Tariff data Yard connection fee: R 540.0 | 9 | Flates | to (Dimenth) | | |
| Average % non payment: 18% | 10 | Met | te (R/month): er rate (R/kl): re-paid (R/kl): | R 4.00 | |
| Capital costs of construction | State belong | | Supering. | | |
| Mechanical / electrical: | R 40,000.00 | | Total: | R 500,000.00 | |
| Civil works: | R 460,000.00 | Co | st per capita: | R 793.65 | |
| Operational and maintenance | costs / month | 441,466 | | | |
| Bulk purchase / Energy: | R 300.00 | | Month | ly wages | |
| Water treatment: | | Operat | or / foreman : | | |
| Spare parts: | | | ariff collector: | | |
| Administration: | | - | pipe minders: | | |
| Pump servicing: | | Committ | ee members: | | |
| Civil works repair: | R 10.00 | Treasurer: Store manager: Plumber / general | | | |
| Transport cost: | R 15.00 | | | R 120.00 | |
| Replacement / emergency fund contribution: | | | maintenance: | R 120.00 | |
| Costs of any other | 1 | Notes: | maintenance. | N 120.00 | |
| external support: | | 140100. | | | |
| Other: | | | | | |
| Total: | R 325.00 | | Total: | R 370.00 | |
| Cash assets and liabilities | | | | | |
| | Descripti | ion | | Amount | |
| Unpaid bills | | | | R 0.00 | |
| | and Stock | | | R 0.00 | |
| Finance data for the last six m | | | | as heather the second | |
| Month | Income | 5 5 4 5 6 5 | | Expenditure | |
| 1 | | R 543.00 | | R 116.00 | |
| 2 3 | | R 450.94 R 469.14 | | R 414.00 R 450.00 | |
| 4 | | R 416.12 | | R 286.00 | |
| 5 | | R 380.30 | | R 344.00 | |
| 6 | | R 365.37 | | R 400.00 | |
| Average | | R 437.48 | | R 335.00 | |
| Typical external subsidies rec | eived per month | | | | |
| Subsidy granting body | | Subsidy ty | pe | Amount | |
| | | | | R 0.00 | |
| | | | | R 0.00 | |
| | | | | R 0.00 | |
| Monthly costs summary | | | | | |
| Total monthly cost: | R 695.00 | | | y unit cost of water | |
| Operational cost | | | ding subsidy: | | |
| per capita / month: | R 1.10 | including | all subsidies: | R 5.11 | |

| WRC RURAL WA | TER SUPPLY FINA PROJECT SUMM | ALCOHOL: MARKET IN PROPERTY. | TO SECURE A PROPERTY OF THE PR | ROJECT |
|--|---------------------------------|------------------------------|--|------------------------|
| Name: Esid Reference number: Province: KwaZ Date of commissioning: 06/19 | umbini ulu Natal | Asses | sment date: 03/0 Population: 490 olds served: 400 ement type: Dis | 0 |
| Technical data | and the second | | | |
| Water source: Dam of | on Mhlali River | | Pump usag | e data |
| Treatment type: Sodiu | m Hypo. & rapid sand | | Hrs/month: | |
| Energy type: Eskon | | | KI/month: 420 | 0 |
| Number of ta | aps | | umped (m): 80 | |
| Public: 0 Private: 285 | | | 4* 3.75kW pump | 2kW + 2* 11.5kW + |
| Tariff data | | line absorbe | 4 S.FSKVV purity | 75 (2015) |
| Yard connection fee: R 250 | 00 | Flat-rate | (R/month): | R 30.00 |
| Average % non payment: 68% | .00 | Meter | rate (R/kl): -paid (R/kl): | N 30.00 |
| Capital costs of construction | 1 | | Notes of the life | |
| Mechanical / electrical: | R 400,000.00 | | Total: | R 4,400,000.00 |
| Civil works: | R 4,000,000.00 | Cost | t per capita: | R 897.96 |
| Operational and maintenance | e costs / month | | | |
| Bulk purchase / Energy: | R 3,893.00 | | Monthly w | |
| Water treatment: | R 80.00 | | / foreman : | R 280.00 |
| Spare parts: | | | iff collector: | R 360.00 |
| Administration: Pump servicing: | R 70.00 | Treasurer: | | |
| Civil works repair: | R 700.00 | | | |
| Transport cost: | R 150.00 | | | |
| Replacement / emergency | | Plumber | | |
| fund contribution: | | | aintenance: | R 360.00 |
| Costs of any other external support: Other: | | Notes: | | |
| Total: | R 4,893.00 | | Total: | R 1,000.00 |
| Cash assets and liabilities | | | | |
| | Descripti | on | | Amount |
| Unpaid bills | -t | | | R 0.00 |
| | eter purchases & stock | | | R 33,500.00 |
| Finance data for the last six | | | | |
| Month | Income | 4,735.00 | Exp | enditure R 5,935.00 |
| 2 | | 9,173.73 | | R 5,513.40 |
| 3 | | 4,431.00 | | R 9,398.01 |
| 4 | R | | | R 9,253.00 |
| 5 | | 5,601.24 | | R 6,490.11 |
| 6 | | 9,209.00 | | R 7,028.74 |
| Average | | 6,459.00 | | R 7,269.71 |
| Typical external subsidies re | | 0.1.11 | | |
| Subsidy granting bod | у | Subsidy type | 0 | Amount R 0.00 |
| | | | | R 0.00 |
| | | | | R 0.00 |
| Monthly costs summary | | 100 101100 | | |
| Total monthly cost: | R 5,893.00 | Avera | age monthly un | it cost of water |
| Operational cost | | Excludi | ng subsidy: | R 1.40 |
| per capita / month: | R 1.20 | Including a | Il subsidies: | R 1.40 |

| WRC RURA | L WATER SUPPLY FIN PROJECT SUM | the second second second | | PROJECT |
|--|-----------------------------------|--------------------------|---|---|
| Name: | Ezingeni - Mpini | | essment date: | 01/2000 |
| Reference number: | | - ^ | Population: | |
| | KwaZulu Natal | House | holds served: | |
| Date of commissioning: | | | | Dispersed rural |
| Technical data | | esi ir se s | | |
| Water source: | - | | | sage data |
| Treatment type: | | | Hrs/month: | |
| Energy type: | | ـــــــ | Kl/month: | |
| Public: | er of taps | Head | pumped (m): Other notes: | submersible |
| Private: | | | | 1.5kW |
| Tariff data | | | District Control | |
| Yard connection fee: | | Flat-ra | ate (R/month): | R 10.00 |
| Average % non payment: | 93% | | ter rate (R/kl): | 11 10.00 |
| | | P | re-paid (R/kl): | |
| Capital costs of constr | | | 111111111111111111111111111111111111111 | et a jobs falle Spinite |
| Mechanical / electrical: | R 30,000.0 | | Total: | |
| Civil works: | R 470,000.0 | 00 C | ost per capita: | R 364.43 |
| Operational and mainte | | | | |
| Bulk purchase / Energy: | R 800.0 | | | y wages |
| Water treatment: | | | tor / foreman : | |
| Spare parts: | | | ariff collector: | R 600.00 |
| Administration: | | | pipe minders: tee members: | |
| Pump servicing: Civil works repair: | | Commit | Treasurer: | |
| Transport cost: | R 60.0 | 00 8 | tore manager: | |
| Replacement / emergency | 1, 00. | - | er / general | |
| fund contribution: | | 1 1011101 | maintenance: | |
| Costs of any other | | Notes: | Plumber | has not been paid for |
| external support: | | | | years |
| Other: | | | _ | |
| Total: | R 860. | 00 | Total: | R 600.00 |
| Cash assets and liabili | | | | |
| Henrid bille | Descri | ption | | Amount |
| Unpaid bills Savings | Eskom & stolen assets Stock | | | R 18,008.00 R 2,000.00 |
| | | | | N 2,000.00 |
| Finance data for the las Month | Income | | REDUNE THE T | Expenditure |
| Monun 1 | income | R 70.00 | | R 0.00 |
| 2 | | R 140.00 | | R 490.32 |
| 3 | | R 620.00 | | R 637.00 |
| 4 | | R 0.00 | | R 0.00 |
| 5 | | R 20.00 | | R 730.00 |
| 6 | | R 0.00 | | R 0.00 |
| Average | | R 141.67 | | R 309.55 |
| Typical external subsid | lies received per month | | | |
| Subsidy granti | ng body | Subsidy type | | Amount |
| Eskom | not disc | onnecting su | pply | R 800.00 |
| | | | | R 0.00 |
| | | | | R 0.00 |
| Monthly costs summar | | | | REAL PROPERTY AND ADDRESS OF THE PERTY ADDRESS OF THE PERTY ADDRESS OF THE PERTY AND ADDRESS OF THE PERTY |
| Total monthly cost: | R 1,460.0 | | | y unit cost of water |
| Operational cost | | | uding subsidy: | |
| per capita / month: | R 1. | nel incingină | all subsidies: | R 0.87 |

| WRC RURA | | The second second | NCIAL MODELLI ARY SHEET | NG PROJECT | 25 | |
|---|--|--------------------|----------------------------|---|----------------------------|--|
| Name: | Fairview | | Assessment dat | e: 03/11/1999 | | |
| Reference number: | | | Populatio | | | |
| | KwaZulu Natal | | Households serve | | | |
| Date of commissioning: | 06/1995 | | Settlement type: | | ıl | |
| Technical data | | 136 | | | | |
| Water source: | Umzumbe River | | Pump | usage data | | |
| Treatment type: | Chlorine, lime, alum | 1 | Hrs/mont | | | |
| Energy type: | Electricity | | Kl/mont | h: 6000 | | |
| | er of taps | | Head pumped (m | | | |
| Public: | | | Other note | s: 15 kW pump | | |
| Private: | 224 | | | | | |
| Tariff data | | | | | | |
| Yard connection fee: | | | Flat-rate (R/month | | R 20.00 | |
| Average % non payment: | rage % non payment: 94% Meter rate (R/kl): | | | | | |
| Canital casts of const | tuotian | 372 Project (1972) | Pre-paid (R/k | | | |
| Capital costs of constr Mechanical / electrical: | | 50,000.00 | Tota | al: D | 358,400.00 | |
| Civil works: | | 08,400.00 | Cost per capit | | R 228.57 | |
| | | | ovat per capit | | 11 220.01 | |
| Operational and maint | | R 1,350.00 | Man | thly wages | | |
| Bulk purchase / Energy: Water treatment: | | (1,350.00 | Operator / foremar | | R 600.00 | |
| Spare parts: | | | Tariff collecto | | N 000.00 | |
| Administration: | | | Standpipe minder | | | |
| Pump servicing: | | R 46.00 | Committee member | | | |
| Civil works repair: | | R 200.00 | Treasure | | | |
| Transport cost: | | R 100.00 | Store manage | | | |
| Replacement / emergency | | 11 100.00 | Plumber / general | | | |
| fund contribution: | | | maintenanc | e: | | |
| Costs of any other | | | Notes: | | | |
| external support: | | | | | | |
| Other: | | | | | | |
| Total: | F | 1,696.00 | Tota | al: | R 600.00 | |
| Cash assets and liabili | ties | 10000 | | | 10000 | |
| | | Description | | Amou | | |
| Unpaid bills | Eskom + operator v Stock | vages + los | computer + tools | | R 3,300.00 R 7,000.00 | |
| Savings | | | | | K 7,000.00 | |
| Finance data for the la | | | | Funnadihan | | |
| Month | Inco | ome | | Expenditure | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| | | | R 0.00 | | R 0.00 | |
| | | | N 0.00 | | | |
| Average | dies received per | month | K 0.00 | 100000000000000000000000000000000000000 | | |
| Average Typical external subsid | | | | Amou | ınt | |
| Average | | | Subsidy type | Amou | | |
| Average Typical external subsid | | | | Amou | R 0.00 | |
| Average Typical external subsid | | | | Amou | R 0.00 | |
| Average Typical external subsider Subsider grantic Subsider Grant | ng body | | | Amou | R 0.00 | |
| Average Typical external subsider Subsider grantic Subsider Grant | ng body | | Subsidy type Average mont | hly unit cost of v | R 0.00 R 0.00 R 0.00 | |
| Average Typical external subsite Subsidy granti Monthly costs summa | ng body ry | R 2,296.00 | Subsidy type | hly unit cost of v | R 0.00 R 0.00 R 0.00 | |

| WRC RURAL WA | TER SUPPLY FINA | THE RESERVE OF A PARTY OF THE P | G PROJECT |
|--|----------------------------|--|--------------------------------|
| Name: Kwa | | Assessment date: | 17/01/2000 |
| Reference number: 02KZI | | Population: | |
| Province: KwaZ | | Households served: | |
| Date of commissioning: 03/09/ | | Settlement type: | |
| Technical data | 计数据数据数据 | | |
| Water source: Kuze | | | isage data |
| Treatment type: Clarific | | Hrs/month: | |
| Energy type: Eskon | | KI/month: | |
| Number of ta Public: 70 | ips | Other notes: | Tot.1 = 180, Tot.2 = 12 |
| Private: 6 | | | 4 kW |
| Tariff data | regional for years and per | | had a leading that contrib |
| Yard connection fee: | T | Flat-rate (R/month): | |
| Average % non payment: 50% | | Meter rate (R/kl): Pre-paid (R/kl): | R 8.00 |
| Capital costs of construction | v 2 3 3 | | |
| Mechanical / electrical: | R 150,000.00 | Total: | 1101100000000 |
| Civil works: | R 5,312,000.00 | Cost per capita: | R 682.75 |
| Operational and maintenance | e costs / month | | |
| Bulk purchase / Energy: | R 1,000.00 | | ly wages |
| Water treatment: | | Operator / foreman : | |
| Spare parts: | | Tariff collector: | 11000101 |
| Administration: | | Standpipe minders: | |
| Pump servicing: | | Committee members: Treasurer: | |
| Civil works repair: Transport cost: | R 170.00 | Store manager: | |
| Replacement / emergency | K 170.00 | Plumber / general | |
| fund contribution: | | maintenance: | R 300.00 |
| Costs of any other | 1 | Notes: | 11 000.01 |
| external support: | | | |
| Other: | | | |
| Total: | R 1,170.00 | Total: | R 1,980.00 |
| Cash assets and liabilities | | | |
| Unpaid bills | Descripti | on | Amount R 0.00 |
| Savings Stock | | | R 6,000.00 |
| Finance data for the last six | months | | |
| Month | Income | AND THE SAME SAME SAME | Expenditure |
| 1 | | 9.879.00 | R 2,569.13 |
| 2 | | 8,196.40 | R 5,536.39 |
| 3 | | 7,068.87 | R 3,831.03 |
| 4 | | 5,786.42 | R 3,891.20 |
| 5 | | 2,269.12 | R 5,911.16 |
| 6 | | 1,836.45 | R 10,156.50 |
| Average | R | 5,839.38 | R 5,315.90 |
| Typical external subsidies re | ceived per month | | |
| Subsidy granting body | У | Subsidy type | Amount |
| | | | R 0.00 |
| | | | R 0.00 |
| | | | R 0.00 |
| Manthala anala arresmant | | | |
| | D 0 450 CC | A | |
| Total monthly cost: Operational cost | R 3,150.00 | Average monthly Excluding subsidy: | y unit cost of water R 2.58 |

| WING ROICHE W | PROJECT SUMMA | | THE R. P. LEWIS CO., LANSING | ST KOSECT | |
|---|-------------------------------|--|------------------------------|---|--|
| Name: | Kwanyuswa | Assessn | nent date: | | |
| Reference number: | 02KZN013 | P | opulation: | 2392 | |
| | KwaZulu Natal | Household | | | |
| Date of commissioning: | 03/09/1998 | Settlement type: | | Dispersed rural | |
| Technical data | | 5.010 | (\$P(1), 1) | | |
| | Ncakete River | | | age data | |
| | Clarific., gravity sand filte | | rs/month: | | |
| Energy type: | | | KI/month: | | |
| Number | | | | Tot.1 = 150 Tot.2 = 1 | |
| Public: Private: | | Ott | ner notes: | | |
| | 9 | NAME OF THE OWNER, OWNE | Na 805 (15 a 5 | 2016 S 10 10 10 10 10 10 10 10 10 10 10 10 10 | |
| Tariff data | | | | | |
| Yard connection fee: | 000 | Flat-rate (| | 0.000 | |
| Average % non payment: | 99% | | ate (R/kl): aid (R/kl): | R 8.00 | |
| Capital costs of constru | uction | | | | |
| Mechanical / electrical: | R 100,000.00 | | Total: | R 2,268,000.00 | |
| Civil works: | R 2,168,000.00 | Cost p | er capita: | R 948.16 | |
| Operational and mainte | nance costs / month | \$197 (\$680F) | | 1010042111712 | |
| Bulk purchase / Energy: | | | Monthly | wages | |
| Water treatment: | R 820.00 | Operator / | foreman : | R 400.00 | |
| Spare parts: | | Tariff | collector: | R 800.0 | |
| Administration: | | Standpipe | | | |
| Pump servicing: | | Plumber / general maintenance: | | | |
| Civil works repair: | R 300.00 | | | | |
| Transport cost: | R 220.00 | | | | |
| Replacement / emergency | | | | B 200 0 | |
| fund contribution: | | | | R 200.00 | |
| Costs of any other external support: | | Notes: | | | |
| Other: | | | | | |
| Total: | R 1,340.00 | | Total: | R 1,400.00 | |
| Cash assets and liabilit | ies | The Cast of | | udamy distil | |
| | . Descrip | otion | | Amount | |
| Unpaid bills | | | | R 0.00 | |
| Savings | Stock | | | R 5,000.00 | |
| Finance data for the las | t six months | | | | |
| Month | Income | | | Expenditure | |
| 1 | | R 4,971.13 | | R 1,638.11 | |
| 2 | | R 5,230.80 | | R 1,768.04 | |
| 3 | | R 3,548.22 | | R 3,396.46 | |
| 4 | | R 2,973.00 | | R 2,877.99 | |
| 5 | | R 2,081.19 | | R 1,774.99 | |
| 6 | | R 1,429.00 | | R 4,005.99 | |
| Average | | R 3,372.22 | | · R 2,576.93 | |
| Typical external subsid | | | | | |
| Subsidy granting b | ouy 5 | ubsidy type | | Amount R 0.00 | |
| | | | | R 0.00 | |
| | | | | R 0.00 | |
| Monthly costs summar | Vin to the second | 11287 | Set to | | |
| Total monthly cost: | R 2,740.00 | Average | monthly | unit cost of water | |
| Operational cost | | | subsidy: | R 6.01 | |
| | | | subsidies: | R 6.01 | |

| SIN PARTITION OF THE PERSON OF | PROJECT S | UMMA | | | SHIP THE | DOM: PROMISE | |
|--|----------------|------------|--|---|---------------|----------------------------|--|
| | Mission | | Asses | ssment date: | | | |
| Reference number: | | - 1 | Population: | | | | |
| | KwaZulu Natal | - 1 | | olds served: | | | |
| Date of commissioning: | 10/1995 | | Set | tlement type: | Dispersed r | ural | |
| Technical data | | | Carlotte Inc. | PER SE | | | |
| Water source: | | - | | | sage data | | |
| Treatment type: | | - 1 | | Hrs/month: | | | |
| Energy type: | | _ | Head | Kl/month: | | | |
| Numb Public: | er of taps | | | pumped (m): Other notes: | | | |
| Private: | | - 1 | | Other notes. | 4.5 KVV | | |
| | 107 | 0.5 | | Principal Sector | | | |
| Tariff data Yard connection fee: | D 200 00 | | Flat sat | a /D/monthly | | | |
| Average % non payment: | | | Mete | e (R/month): er rate (R/kl): | R 5.00 | | |
| Coultel costs of country | | | Pro | e-paid (R/kl): | | laster and the second | |
| Capital costs of constru Mechanical / electrical: | | 00.00 | | Total: | | R 120,000.0 | |
| Civil works: | | 00.00 | Co | st per capita: | | R 140.1 | |
| | | _ | | per copia. | | | |
| Operational and mainte | | 140.00 | | Month | h. waaaa | | |
| Bulk purchase / Energy: Water treatment: | | 140.00 | Operate | or / foreman : | y wages | R 400.0 | |
| Spare parts: | | - 1 | | riff collector: | | R 200.0 | |
| Administration: | | - 1 | Standpipe minders: Committee members: Treasurer: | | | R 200.0 | |
| Pump servicing: | | - 1 | | | | | |
| Civil works repair: | | - 1 | | | | | |
| Transport cost: | | 70.00 | Str | re manager: | | | |
| Replacement / emergency | | 70.00 | Plumber / general maintenance: | | | | |
| fund contribution: | | - 1 | | | | | |
| Costs of any other | | ı | Notes: | | | | |
| external support: | | - 1 | | | | | |
| Other: | | | | | | | |
| Total: | R | 210.00 | | Total: | | R 600.0 | |
| Cash assets and liabilit | ties | | | | | | |
| | D | escription | on | | An | nount | |
| Unpaid bills | Chairman wages | | | | | R 100.00 | |
| Savings | | | | | | R 8,000.0 | |
| Finance data for the las | st six months | | 10 | | 100 (1.00) | | |
| Month | Income | | | | Expenditure | | |
| 1 | | | R 364.98 | | | R 740.0 | |
| 2 | | | 2,290.66 | | | R 740.0 | |
| 3 | | | R 301.93 | | | R 740.0 | |
| 4 | | | R 242.05 | | | R 720.0 | |
| 5 | | | R 680.56 | | | R 1,270.0 | |
| 6 Average | | | R 742.23 | | | R 580.0 R 798.3 | |
| Average | | | 770.40 | | Salata and | R /96.3 | |
| Typical external subside Subside granting | | | Subsidy ty | ne . | A. | nount | |
| outany granu | -g souy | | Out and ity | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | All | R 0.0 | |
| | | | | | | R 0.0 | |
| | | | | | | R 0.0 | |
| | | | 1254 5.11 | | | | |
| Monthly costs summar | y | | | | | | |
| Monthly costs summar Total monthly cost: | | 810.00 | Ave | rage monthly | y unit cost o | of water | |
| | R | 810.00 | Exclu | rage monthly ding subsidy: all subsidies: | | of water R 4.2 R 4.2 | |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | A CONTRACTOR OF THE PROPERTY O | G PROJECT |
|---|--|--|----------------------------|
| Reference number: | Montebello KwaZulu Natal | Assessment date: Population: Households served: | 2000 |
| Technical data | San | | |
| Water source: | Mdloti River | Pump t | ısage data |
| | Sodium Hypochloride | Hrs/month: | |
| Energy type: | | Kl/month: | |
| Number Public: | er of taps | Head pumped (m): Other notes: | |
| Private: | | Other notes: | 2* 1.5kW |
| Tariff data | 100 | | |
| Yard connection fee: | R 250.00 | Flat-rate (R/month): | |
| Average % non payment: | | Meter rate (R/kl): Pre-paid (R/kl): | R 2.00 |
| Capital costs of constru | uction | taning period | a modellist a vectories at |
| Mechanical / electrical: | R 150,000.00 | Total: | |
| Civil works: | R 1,150,000.00 | Cost per capita: | R 650.00 |
| Operational and mainte | nance costs / month | | |
| Bulk purchase / Energy: | R 1,100.00 | | ly wages |
| Water treatment: | R 64.00 | Operator / foreman : | |
| Spare parts: | | Tariff collector: | |
| Administration: | | Standpipe minders: Committee members: | |
| Pump servicing: Civil works repair: | R 30.00 | Treasurer: | |
| Transport cost: | R 44.00 | Store manager: | |
| Replacement / emergency | | Plumber / general | |
| fund contribution: | R 500.00 | maintenance: | R 360.00 |
| Costs of any other external support: Other: | | Notes: | |
| Total: | R 1,738.00 | Total: | R 360.00 |
| Cash assets and liabilit | ies | | |
| | Descripti | on | Amount |
| Unpaid bills Savings | Stores | | R 0.00 R 1,000.00 |
| Finance data for the las | t six months | | |
| Month | Income | | Expenditure |
| 1 2 3 4 5 | | | |
| Average | R | 1,386.00 | R 1,254.00 |
| Typical external subsid | | | |
| Subsidy grantin | | Subsidy type | Amount |
| | | | R 0.00 |
| | | | R 0.00 |
| PRODUCTION OF THE PROPERTY OF | | | R 0.00 |
| Monthly costs summar | the second secon | | |
| Total monthly cost: | R 2,098.00 | | y unit cost of water |
| Operational cost per capita / month: | 0.100 | Excluding subsidy: Including all subsidies: | |
| per capita / month: | R 1.05 | including all subsidies. | K 1.80 |

| WRC RURAL WAT | PROJECT SUMMA | CONTRACTOR OF THE PROPERTY. | DELLING PR | OJECT |
|--|-----------------|-----------------------------|------------------|------------------------|
| Name: Myun | vane | Assess | ment date: 02/0 | 2/1999 |
| Reference number: C.1.920 | | | opulation: 3696 | |
| Province: KwaZul | | Households served: | | |
| Date of commissioning: 19/11/1 | 998 | Settle | ment type: Disp | ersed rural |
| Technical data | | | | |
| Water source: 2 Boreh | oles | | Pump usage | data |
| Treatment type: None | | + | rs/month: | |
| Energy type: Electric | | | KI/month: 900 | |
| Number of tap | s | | | 88m, B2 = 93m |
| Public: 25 Private: 0 | | O | ther notes: P1 = | : 7.5kW : 5.5kW |
| Tariff data | | 9 9 9 9 1 9 1 9 1 9 | | 0.00.11 |
| Yard connection fee: | | Flat-rate (| R/month): | |
| Average % non payment: 47% | | | rate (R/kl): | |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | oaid (R/kl): | R 2.00 |
| Capital costs of construction | Miller Comment | | ration (gland) | |
| Mechanical / electrical: | R 70,000.00 | | Total: | R 551,494.00 |
| Civil works: | R 481,494.00 | Cost | per capita: | R 149.21 |
| Operational and maintenance | | | | e resido das 4 |
| Bulk purchase / Energy: | R 500.00 | | Monthly wa | |
| Water treatment: | | | foreman: | R 200.0 |
| Spare parts: | | | f collector: | |
| Administration: | | | e minders: | |
| Pump servicing: | D 474 00 | Committee | | |
| Civil works repair: | R 171.00 | | Treasurer: | |
| Transport cost: Replacement / emergency | | Plumber / | manager: | |
| fund contribution: | | | intenance: | |
| Costs of any other | 1 | Notes: | interiarios. | |
| external support: | | 140100. | | |
| Other: | | | | |
| Total: | R 671.00 | | Total: | R 200.00 |
| Cash assets and liabilities | | RITER IN SO | Selling The | |
| | Descripti | on | | Amount |
| Unpaid bills | | | | R 0.00 |
| Savings Stock | | | | R 2,000.00 |
| Finance data for the last six m | | | | |
| Month | Income | 215.00 | Expe | enditure |
| 1 | | R 715.00 | | R 1,082.67 |
| 2 | | 1,015.00 | | R 760.00 |
| 3 4 | | 1,250.00 | | R 400.00 |
| 5 | | 2,225.00 | | R 1,107.00 |
| 6 | | 1,480.00 1,770.00 | | R 2,512.00 R 708.55 |
| Average | | 1,409.17 | | R 1,095.04 |
| Typical external subsidies rec | | | | |
| Subsidy granting body | erved per month | Subsidy type | | Amount |
| Joseph J. Grand Cody | | | | R 0.00 |
| | | | | R 0.00 |
| | | | | R 0.00 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 871.00 | | e monthly uni | |
| Operational cost | | | g subsidy: | R 0.24 |
| per capita / month: | R 0.24 | Including all | subsidies: | R 0.24 |

| MERCHANIST PURPOSE STATE | PROJ | ECT SUMMA | ART SHEE | SERVICE: | | 资本性 古人知识 | |
|--|---------------------|----------------------|---|-----------------------------------|---------------|--------------------------|--|
| | Ngolokodo | | Asse | ssment date: | | | |
| Reference number: | | | Population: | | | | |
| | KWaZulu Natal | - 1 | | nolds served: | | | |
| Date of commissioning: | 1996 | | Set | tlement type: | Dispersed r | ural | |
| Technical data | 311192 | | | | 3 | Jacobski sk | |
| Water source: | | | | | sage data | | |
| Treatment type: | | - 1 | | Hrs/month: | 010 | | |
| Energy type: | er of taps | | Hond | KI/month: | 910 | | |
| Public | | | neau | pumped (m): Other notes: | | | |
| Private: | | - 1 | | Outer Hotes. | | | |
| Tariff data | e a construction of | Made lives voided | Ad Billsian o | MINNS INCID | 0.000 100 500 | | |
| Yard connection fee: | R20 / month | | Flat-rat | te (R/month): | | R 5.00 | |
| Average % non payment: | | | Met | er rate (R/kl): e-paid (R/kl): | | N 5.01 | |
| Capital costs of constr | uction | | | | | | |
| Mechanical / electrical: | | R 40,000.00 | | Total: | | R 788,200.00 | |
| Civil works: | | R 748,200.00 | Co | st per capita: | | R 200.00 | |
| Operational and mainte | enance costs / | month | | | | | |
| Bulk purchase / Energy: | | R 1,500.00 | | Month | ly wages | | |
| Water treatment: | | | Operator / foreman : Tariff collector: Standpipe minders: Committee members: Treasurer: | | | | |
| Spare parts: | | - 1 | | | | | |
| Administration: | | - 1 | | | | R 1,680.0 | |
| Pump servicing: | | D 000 00 | | | | | |
| Civil works repair: | | R 200.00 R 120.00 | | | | | |
| Transport cost: Replacement / emergency | | K 120.00 | | | | | |
| fund contribution: | | - 1 | | | | | |
| Costs of any other | | 1 | | | | | |
| external support: | | - 1 | | | | | |
| Other: | | | | | | | |
| Total: | | R 1,820.00 | | Total: | | R 1,680.0 | |
| Cash assets and liability | ties | | | 0.00 | | | |
| | | Descripti | on | | Ar | nount | |
| Unpaid bills | Vandalism & bro | ken assets | | | | R 600.00 | |
| Savings | Stock | | | | | R 200.00 | |
| Finance data for the las | | | | | | | |
| Month | | ncome | | | Expenditure | | |
| 1 | | | 2,060.00 | | | R 1,943.70 | |
| 2 | | | 2,880.00 | | | R 1,280.80 R 1,184.85 | |
| 3 | | | 2,400.00 1,865.00 | | | R 1,164.83 | |
| 5 | | | 2,270.00 | | | R 912.8 | |
| 6 | | | 1,425.00 | | | R 910.25 | |
| Average | R 2,150.00 | | | R 1,215.55 | | | |
| Typical external subsid | lies received p | er month | | V. | | | |
| Subsidy granting | | | Subsidy ty | pe | Ar | nount | |
| | | | | | | R 0.00 | |
| | | | | | | R 0.0 | |
| | | | | | | R 0.0 | |
| Monthly costs summar | У | Anna Lat. Apply | | | | | |
| Total monthly cost: | | R 3,500.00 | | rage monthly | | | |
| Operational cost | | ſ | Excluding subsidy: | | | R 3.8 | |
| per capita / month: | | R 0.89 | | all subsidies: | | R 3.8 | |

| | PROJECT SUMMA | | | 40/44/4000 | |
|---|---------------------------------------|--|-----------------------------|---|--|
| | Nhlungwane | Asse | ssment date: | | |
| Reference number: | KwaZulu Natal | Housek | Population: olds served: | | |
| Date of commissioning: | | | | Dispersed rural | |
| Technical data | | cambra co | зеттети суре. | Dispersed rurar | |
| Water source: | Borehole | 2000 | Pump | sage data | |
| Treatment type: | | | Hrs/month: | isage data | |
| Energy type: | | | Kl/month: | 459 | |
| | er of taps | Head | pumped (m): | | |
| Public: | | | Other notes: | | |
| Private: | 0 | | | | |
| Tariff data | 100 6 5 10 21 63 | 19805 | te di filia | er sandálálatu arszlá | |
| Yard connection fee: | | | e (R/month): | R 7.00 | |
| Average % non payment: | 1% | Meter rate (R/kl): Pre-paid (R/kl): | | | |
| Capital costs of constr | uction | | | | |
| Mechanical / electrical: | | Total: | | R 285,600.00 | |
| Civil works: | R 245,600.00 | Cos | st per capita: | R 200.00 | |
| Operational and mainte | enance costs / month | | | | |
| Bulk purchase / Energy: | | | | ly wages | |
| Water treatment: | | | or / foreman : | | |
| Spare parts: | | | riff collector: | 110010 | |
| Administration: | | | ipe minders: | | |
| Pump servicing: | | Committe | e members: | | |
| Civil works repair: Transport cost: | | Ste | Treasurer: ore manager: | | |
| Replacement / emergency | K 100.00 | | / general | | |
| fund contribution: | R 100.00 | | naintenance: | R 50.0 | |
| Costs of any other | | Notes: | | | |
| external support: | | | | | |
| Other: | | | | B 400 0 | |
| Total: | | | Total: | R 400.0 | |
| Cash assets and liabili | Descripti | on | | Amount | |
| Unpaid bills | Hydroquest | OII | | R 3,500.0 | |
| Savings | Stock | | | R 500.00 | |
| Classes data for the te- | st six months | 46.6 | | U forte like a count | |
| r mance data for the las | I I I I I I I I I I I I I I I I I I I | | | Expenditure | |
| Month | Income | | | R 667.00 | |
| 1 | R | 1,191.30 | | D 7770 00 | |
| Month 1 2 | R R | 1,166.50 | | | |
| Month 1 2 3 | R R R | 1,166.50 1,420.20 | | R 770.00 | |
| Month 1 2 3 4 | R R R | 1,166.50 1,420.20 1,570.00 | | R 770.00 R 965.00 | |
| Month 1 2 3 | R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 | | R 770.00 R 965.00 R 244.00 | |
| Month 1 2 3 4 5 | R R R R R | 1,166.50 1,420.20 1,570.00 | | R 778.00 R 770.00 R 965.00 R 244.00 R 850.00 | |
| Month 1 2 3 4 5 6 Average | R R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 | | R 770.00 R 965.00 R 244.00 R 850.00 | |
| Month 1 2 3 4 5 6 Average | R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 | De | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 | |
| Month 1 2 3 4 5 6 Average Typical external subside | R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 1,436.50 | De . | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 | |
| Month 1 2 3 4 5 6 Average Typical external subside | R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 1,436.50 | De De | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 Amount R 0.00 R 0.00 | |
| Month 1 2 3 4 5 6 Average Typical external subsides Subsidy granti | R R R R R R R R R R R R R R R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 1,436.50 | De | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 Amount R 0.00 R 0.00 | |
| Month 1 2 3 4 5 6 Average Typical external subsice Subsidy granti | R R R R R R R R R R R R R R R R R R R | 1,166.50 1,420.20 1,570.00 1,570.00 1,572.00 1,436.50 Subsidy ty | | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 Amount R 0.00 R 0.00 | |
| Month 1 2 3 4 5 6 Average Typical external subside | R R R R R R R R R R R R R R R R R R R | 1,166.50 1,420.20 1,570.00 1,699.00 1,572.00 1,436.50 Subsidy ty | | R 770.00 R 965.00 R 244.00 R 850.00 R 712.33 Amount R 0.00 R 0.00 y unit cost of water | |

| WRC RURA | L WATER SUPP PROJEC | The second second | DOMESTIC AND DESCRIPTION OF THE PARTY OF THE | AND REST. LOADS NO. 1881 | G PROJEC | Т |
|---|--|-------------------|--|---|----------------|---------------------------|
| Reference number: Province: | Nomponjwana 02KZN081 KwaZulu Natal | T COMM | Assessment date: 0 Population: 1 Households served: 7 Settlement type: D | | 1600 764 | muni |
| Date of commissioning: | 12/1999 | 50557 | 36 | strement type: | Dispersed ru | iruai |
| Technical data | 1. D | SPICE IS | 2 1 1 1 5 1 | | | |
| | Hlamanyati River plate-settler, rapid g | ravity can | | Hrs/month: | sage data | |
| Energy type: | | lavity sain | | Kl/month: | | |
| | er of taps | | Head | d pumped (m): | | |
| Public: | | | | Other notes: | | |
| Private: | 764 | | | 2* (7.5kW | / + 2° 30kW) | |
| Tariff data | | mus is | | elliche sande. | 8 PHAIR AND | H Brain |
| Yard connection fee: Average % non payment: | | | Me | ate (R/month): ter rate (R/kl): re-paid (R/kl): | | R 25.00 |
| Capital costs of constr | uction | | 201383 | | 0.01 | PROTECTION CO. |
| Mechanical / electrical: | | 00,000,00 | | | R | 9,200,000.00 |
| Civil works: | | 00.000,00 | C | | | R 5,750.00 |
| Operational and mainte | enance costs / mo | nth | 41.5 | | | |
| Bulk purchase / Energy: | | 3,500.00 | Monthly wa | | ly wages | |
| Water treatment: | | R 200.00 | Opera | tor / foreman : | | R 1,550.00 |
| Spare parts: | | | | ariff collector: | | R 800.00 |
| Administration: | | | | pipe minders: | | R 1,200.00 |
| Pump servicing: | | - 1 | Commit | tee members: | | D 4 600 0 |
| Civil works repair: Transport cost: | | 1,000.00 | 0 | Treasurer: tore manager: | | R 1,600.00 |
| Replacement / emergency | 15 | 1,000.00 | | er / general | | K 1,000.00 |
| fund contribution: | | | 1 Ioiiio | maintenance: | | R 2,480.00 |
| Costs of any other external support: Other: | | | Notes: | | | |
| Total: | R | 4,700.00 | | Total: | | R 9,230.00 |
| Cash assets and liabilit | ties | | | | | |
| | | Description | on | | Am | ount |
| Unpaid bills | Eskom + shop credit | t + broken | stores | | | R 17,500.00 |
| Savings | Savings + stock | | wansaanaa | | | R 215,000.00 |
| Finance data for the las | | | | | | |
| Month | Inco | | 2 222 22 | | Expenditure | D 0 000 00 |
| 2 | | | 2,880.00 7,652.00 | | | R 2,880.00 R 14,504.09 |
| 3 | | | 0,104.00 | | | R 15,674.67 |
| 4 | | | 15,300.00 | | R 13,611.0 | |
| 5 | | | 14,705.00 | | R 15,398.0 | |
| 6 | | | 2,820.00 | | | R 13,476.00 |
| Average | | R 1 | 2,243.50 | | | R 12,590.63 |
| Typical external subsid | lies received per r | month | | | | |
| Subsidy granting | ng body | | Subsidy t | ype | Am | ount |
| | | | | | | R 0.00 |
| | 1 | | | | | R 0.00 |
| | | | | | | R 0.00 |
| Monthly costs summar | | 12.000.00 | | | | |
| | R 1 | 13,930.00 | Av | erage monthly | y unit cost of | water |
| Total monthly cost: Operational cost | - | , | | uding subsidy: | | R 1.34 |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | AND DESCRIPTION OF THE PERSON | | PROJECT | |
|--|--|---|-----------------------------|----------------------------|--|
| Name: | South Coast 1 | | essment date: | 05/11/1999 | |
| Reference number: | Country of the countr | 7100 | Population: | | |
| | KwaZulu Natal | House | holds served: | | |
| Date of commissioning: | 02/1995 | Se | ttlement type: | Dispersed rural | |
| Technical data | | | | | |
| Water source: | | | | sage data | |
| Treatment type: | | | Hrs/month: | n/a | |
| Energy type: | | Viced | Kl/month: | | |
| Public: | er of taps | nead | pumped (m): Other notes: | | |
| Private: | | | Other riotes. | | |
| Tariff data | | | | | |
| Yard connection fee: | R 850.00 | Flat-ra | ite (R/month): | | |
| Average % non payment: | | Meter rate (R/kl): Pre-paid (R/kl): | | R 4.00 | |
| Capital costs of constru | uction | | | | |
| Mechanical / electrical: | | Total: | | R 14,700,000.00 | |
| Civil works: | R 14,700,000.00 | Co | ost per capita: | R 1,792.68 | |
| Operational and mainte | nance costs / month | | | | |
| Bulk purchase / Energy: | R 22,000.00 | | | y wages | |
| Water treatment: | | | or / foreman : | R 800.00 | |
| Spare parts: | | | ariff collector: | R 1,200.00 | |
| Administration: | | | pipe minders: | D 4 000 0 | |
| Pump servicing: Civil works repair: | R 766.00 | Committee members: Treasurer: Store manager: Plumber / general | | R 4,000.00 | |
| Transport cost: | R 150.00 | | | | |
| Replacement / emergency | K 150.00 | | | | |
| fund contribution: | | | maintenance: | | |
| Costs of any other | | Notes: | | water cost R3.32 | |
| external support: | | | Loss | es 73% | |
| Other: Total: | R 22.916.00 | | Total: | R 6.000.00 | |
| Cash assets and liabilit | | | i Otal. | R 6,000.00 | |
| Cash assets and habilit | Descript | ion | | Amount | |
| Unpaid bills | Ugu Regional Council | IOIT | | R 150,000.00 | |
| Savings | Stock | | | R 2,000.00 | |
| Finance data for the las | at six months | no di dite | 16-1-1806 | ACCIONES ACCION | |
| Month | Income | | | Expenditure | |
| 1 | | 12,889.59 | | R 14,532.18 | |
| 2 | | 18,074.13 | | R 12,718.21 | |
| 3 | | 22,445.92 | | R 13,224.13 | |
| 5 | | 18,330.46 17,531.76 | | R 12,306.91 | |
| 6 | | 23,946.86 | | R 14,833.74 R 12,587.62 | |
| Average | | 18,869.79 | | R 13,367.13 | |
| Typical external subsid | | traslinas. | 4 3 6 1.05 8 8 8 | be significant and | |
| Subsidy granting | | Subsidy type | | Amount | |
| | | | | R 0.00 | |
| | | | | R 0.00 | |
| | | | | R 0.00 | |
| Monthly costs summar | | | | | |
| Total monthly cost: | R 28,916.00 | Ave | erage monthly | y unit cost of water | |
| Operational cost | | | uding subsidy: | R 3.53 | |

| WRC RURA | L WATER SUPI PROJEC | CT SUMM | State of the State | NEW TOTAL PROPERTY OF STREET | PROJE | |
|--|------------------------------------|-------------------|--|-------------------------------------|--|--------------------|
| Name: | Thuthukani | | Ass | essment date: | 05/01/2000 | |
| Reference number: | | | | Population: | 2448 | |
| Province: | KwaZulu Natal | | House | cholds served: | 306 | |
| Date of commissioning: | Mar-97 | | Se | ttlement type: | Village | |
| Technical data | | | | | | |
| Water source: | | | | | isage data | |
| Treatment type: | | | | Hrs/month: | | |
| Energy type: | | | Hend | Kl/month: | | |
| Public: | er of taps | | Head | other notes: | | |
| Private: | _ | | | Other flotes. | 3.7 KVV | |
| Tariff data | | | | | 336 11636 | La Ladde Lat. |
| Yard connection fee: | R 332.00 | | Flat-ra | ate (R/month): | | R 10.0 |
| Average % non payment: | | | Me | ter rate (R/kl): re-paid (R/kl): | | 11 10.0 |
| Capital costs of constru | uction | A Lor | | 7. FR | | |
| Mechanical / electrical: | | 30,000.00 | | Total: | | R 164,719.0 |
| Civil works: | R | 134,719.00 | C | ost per capita: | | R 67.2 |
| Operational and mainte | nance costs / m | onth | Alienten a | APHIDAGE IN | PHILIP IN | |
| Bulk purchase / Energy: | | R 400.00 | | Month | ly wages | |
| Water treatment: | | | Operat | tor / foreman : | | |
| Spare parts: | | - 1 | | ariff collector: | | |
| Administration: | | - 1 | | pipe minders: | | |
| Pump servicing: | | | Commit | tee members: | | |
| Civil works repair: | | R 116.60 | | | | |
| Transport cost: | | R 300.00 | | tore manager: | | |
| Replacement / emergency fund contribution: | | - 1 | | er / general | | |
| Costs of any other | | | Notes: | maintenance: | | |
| external support: | | Í | 140163. | | | |
| Other: | | | | | | |
| Total: | | R 816.60 | | Total: | | R 0.0 |
| Cash assets and liabilit | ies | | Jeg and | 100 | U area | |
| ousii ussets uita habiin | - | Descripti | on | | Ar | mount |
| Unpaid bills | Eskom | 2000.41 | | | | R 130.00 |
| Finance data for the las | t six months | | 238 st. 1 | | 5 11 State 51 | 60 RÚ 1000 Ú 100 |
| Month | | ome | | | Expenditure | |
| 1 | | | R 570.00 | | | R 400.0 |
| 2 | | | R 470.00 | | | R 400.00 |
| 3 | | | R 350.00 | | | |
| 4 | | | R 350.00 | | | |
| 5 | | | R 270.00 | | R 457.0 | |
| 6 | | | R 200.00 | | | R 388.03 |
| Average | | | R 368.33 | | | R 274.1 |
| Typical external subsid | NAME AND ADDRESS OF TAXABLE PARTY. | month | | | | |
| Subsidy granting | ng body | | Subsidy ty | ype | Ar | mount |
| | | | | | | R 0.00 |
| | | | | | | R 0.0 |
| | | 65 H 6 G (65 H C) | e ligated a | | S 5 11 100 01 | N 0.0 |
| Monthly costs summer | | | | | SERVER SE | |
| | , | R 816 60 | Ave | erage monthly | v unit cost | of water |
| Monthly costs summary Total monthly cost: Operational cost | AMERICALISMS | R 816.60 | | erage monthly uding subsidy: | | of water R 0.33 |

| WKC KUKA | L WATER SUPI PROJE | CT SUMMA | ALC: THE RESIDENCE | Water agreement and address of the | PROJEC | |
|---|-----------------------|---------------|--------------------|------------------------------------|---|-----------------------|
| Name: | Vukanathi | | Asses | sment date: | 04/02/2000 | |
| Reference number: | | $\overline{}$ | 7.0000 | Population: | | |
| Province: | KwaZulu Natal | - 1 | Househ | olds served: | | |
| Date of commissioning: | 1997 | | Setti | lement type: | Dispersed ru | ural |
| Technical data | | | May He | | | |
| Water source: | Imise River | | | | sage data | |
| Treatment type: | | | | Hrs/month: | n/a | |
| Energy type: | | | | KI/month: | | |
| | er of taps | | | numped (m): | | |
| Public: Private: | | | | Other notes: | | |
| Tariff data | | undelines. | | | 100000000000000000000000000000000000000 | ASSESSED AND ADDRESS. |
| Yard connection fee: | | 01100000000 | Elat cate | /D/month): | | R 7.00 |
| Average % non payment: | | - 1 | | r rate (R/kl): | | K 7.00 |
| Average % non payment. | 100% | | | -paid (R/kl): | | |
| Capital costs of constru | uction | | | paid (relia). | | |
| Mechanical / electrical: | | R 0.00 | | Total: | | R 150,000.00 |
| Civil works: | | 150,000.00 | Cos | t per capita: | | R 306.12 |
| Operational and mainte | nance costs / m | onth | 3010000 | A CONTRACTOR | | |
| Bulk purchase / Energy: | | Ollur | | Monthl | y wages | |
| | Water treatment: R 44 | | Operator | r / foreman : | y nuges | |
| Spare parts: | | | | riff collector: | | |
| Administration: | | - 1 | | pe minders: | | |
| Pump servicing: | | - 1 | | e members: | | |
| Civil works repair: | | - 1 | - | Treasurer: | | |
| Transport cost: | | 1 | Sto | re manager: | | |
| Replacement / emergency | | | | / general | | |
| fund contribution: | | - 1 | | aintenance: | | |
| Costs of any other | | ı | Notes: | | | |
| external support: | | - 1 | | | | |
| Other: | | - 1 | | | | |
| Total: | | R 44.00 | | Total: | | R 0.00 |
| Cash assets and liabilit | ties | | | | | |
| | | Descripti | on | | Am | nount |
| Unpaid bills | | | | | | R 0.00 |
| Savings | Stock + replacement | ent fund | | | | R 1,300.00 |
| Finance data for the las | st six months | | | mark the second | | Strines. |
| Month | Inc | come | | | Expenditure | |
| 1 | | N | o income | No exp | | sts kept within |
| 2 | | | - 1 | | ı | he community |
| 3 | | | - 1 | | | |
| 4 | | | - 1 | | | |
| 5 | | | - 1 | | | |
| 6 | | | D 0 00 | | | B 0 0/ |
| Average | | | R 0.00 | | SULTES STOR | R 0.00 |
| Typical external subsid | | month | Cubaidu ba | | A | |
| Subsidy granting | ig body | Subsidy type | | АП | nount R 0.00 | |
| | | | | | | R 0.00 |
| | | | | | | R 0.00 |
| | у | 63184 | April Colonia | | | |
| Monthly costs summar | | | | age monthly | y unit cost o | of water |
| Total monthly costs | | R 44.00 | Aver | age monuny | y will cost o | AL AMORPOL |
| Monthly costs summar Total monthly cost: Operational cost | | R 44.00 | | ling subsidy: | | R 0.09 |

| WRC RURA | L WATER SUF PROJE | PLY FINA | BUILD THE COLOR OF THE | 1000-9000A-200-M-45-00 | PROJECT |
|-----------------------------|--|-------------|------------------------|-----------------------------------|--------------------|
| Name: | Zamimpilo | | | ssment date: (| 05/02/2000 |
| Reference number: | | | | Population: 3 | |
| Province: | KwaZulu Natal | | Househ | olds served: | |
| Date of commissioning: | 1997 | | Sett | dement type: I | Dispersed rural |
| Technical data | | Maria Inter | | vel territorit | PROPERTY OF THE |
| Water source: | | | | | sage data |
| Treatment type: | | - 1 | | Hrs/month: r | n/a |
| Energy type: | | | | Kl/month: | |
| Numbi Public: | er of taps | | | oumped (m): Other notes: | |
| Private: | | - 1 | | Other notes. | |
| Tariff data | | | Average 149 | ummiosi negli | possible controls |
| Yard connection fee: | | | Flat-rati | e (R/month): | R 10.00 |
| Average % non payment: | 17% | | Mete | er rate (R/kl): e-paid (R/kl): | 10.00 |
| Capital costs of constr | uction | | The Contract | para (rem). | |
| Mechanical / electrical: | a caroni | R 0.00 | | Total: | R 104,000.00 |
| Civil works: | R | 104,000.00 | Cos | st per capita: | R-322.98 |
| Operational and mainte | | | | | |
| Bulk purchase / Energy: | mance costs ri | TOTAL | | Monthly | y wages |
| Water treatment: | | R 50.00 | Operato | r / foreman : | wages |
| Spare parts: | | | | riff collector: | |
| Administration: | | - 1 | Standp | ipe minders: | |
| Pump servicing: | | | Committe | e members: | |
| Civil works repair: | | - 1 | | Treasurer: | |
| Transport cost: | | | | re manager: | |
| Replacement / emergency | | - 1 | Plumber / general | | |
| fund contribution: | | | | naintenance: | |
| Costs of any other | | | Notes: | | |
| external support: Other: | | | | | |
| Total: | | R 50.00 | | Total: | R 0.00 |
| Cash assets and liabilit | lian. | 11 00.00 | | 1000 | |
| Cash assets and habili | ies | Descripti | on | | Amount |
| Unpaid bills | | | | | R 0.00 |
| Savings | Savings + stock | | | | R 11,470.75 |
| Finance data for the las | st six months | | HOSPIE. | | iddin artistici es |
| Month | Ir | come | | | Expenditure |
| 1 | | | R 400.00 | | |
| 2 | | | R 360.00 | | R 299.54 |
| 3 4 | | | R 380.00 | | R 550.00 |
| 5 | | | R 330.00 R 410.00 | | R 129.00 |
| 6 | | | R 400.00 | | R 75.46 |
| Average | | | R 380.00 | | R 175.67 |
| Typical external subsid | lies received pe | | and the same | or Description | The second of |
| Subsidy grantin | | T | Subsidy typ | e I | Amount |
| | | | 7 -75 | | R 0.00 |
| | | 1 | | | R 0.00 |
| | | | | | R 0.00 |
| Monthly costs summar | У | | | | |
| Total monthly cost: | The state of the s | R 50.00 | Aver | rage monthly | unit cost of water |
| rotal monthly cost. | | | | | |
| Operational cost | | | | ding subsidy: _ all subsidies: | R 0.16 R 0.16 |

| WRC RURAL WAT | PROJECT SUMMA | and the state of the state of | | G PROJEC | T |
|---------------------------------|------------------|---|--------------|----------------|--------------|
| Name: Masa | kala | Assess | ment date: | 01/02/2000 | |
| Reference number: | | | Population: | | |
| Province: Eastern | n Cape | | lds served: | | |
| Date of commissioning: 05/199 | | Settle | ement type: | Village | |
| Technical data | Strawerland | | | Halle From | Marie a |
| Water source: 2 Bore | holes & spring | | | usage data | |
| Treatment type: None | | | Hrs/month: | | |
| Energy type: Electric | | | KI/month: | | |
| Number of ta | ps | | umped (m): | | |
| Public: 84 | | 0 | ther notes: | | |
| Private: 0 | | | | | |
| Tariff data | | | | | |
| Yard connection fee: | | | (R/month): | | |
| Average % non payment: | | | rate (R/kl): | | |
| | | Pre- | paid (R/kl): | | R 5.00 |
| Capital costs of construction | | | | | |
| Mechanical / electrical: | R 60,000.00 | | Total: | R | 1,400,000.00 |
| Civil works: | R 1,340,000.00 | Cost | per capita: | | R 280.00 |
| Operational and maintenance | costs / month | | | | |
| Bulk purchase / Energy: | R 472.00 | | Month | ly wages | |
| Water treatment: | | Operator / foreman : Tariff collector: | | | R 900.00 |
| Spare parts: | | | | | |
| Administration: | | Standpip | e minders: | | |
| Pump servicing: | | Standpipe minders: Committee members: | | | |
| Civil works repair: | R 140.00 | | | | R 300.00 |
| Transport cost: | R 40.00 | Store | e manager: | | |
| Replacement / emergency | | Plumber / | | | |
| fund contribution: | | | aintenance: | | R 300.00 |
| Costs of any other | | Notes: | | | |
| external support: | R 100.00 | | | | |
| Other: | | | | | |
| Total: | R 752.00 | | Total: | | R 1,500.00 |
| Cash assets and liabilities | | | | | |
| | Descripti | on | | Am | ount |
| Unpaid bills | | | | | R 0.00 |
| Savings Emerg | ency fund | | | | R 8,000.00 |
| Finance data for the last six r | nonths | | | | |
| Month | Income | | | Expenditure | |
| 1 | | 3,441.99 | | | R 2,211.67 |
| 2 | | 3,511.16 | | R 2,528. | |
| 3 | | 3,810.29 | | R 2,445. | |
| 4 | R | 2,803.38 | | R 2,381 | |
| 5 | R | 1,807.78 | | | R 2,177.86 |
| 6 | R | 1,506.96 | | | R 3,925.68 |
| Average | R | 2,813.59 | | | R 2,611.71 |
| Typical external subsidies re | ceived per month | | | | |
| Subsidy granting body | | Subsidy type | 9 | Am | ount |
| | | | | | R 0.00 |
| | | | | | R 0.00 |
| | | | | | R 0.00 |
| Monthly costs summary | | | | | |
| Total monthly cost: | R 2,252.00 | | | ly unit cost o | |
| Operational cost | | Excludi | ng subsidy: | | R 5.96 |
| per capita / month: | | Including al | | | R 5.96 |

| | PROJECT SUMM | ARY SHEET | | 1993年联营 |
|---|--|--|-------------|------------------|
| Name: Ngqele | | Assessment date: | | |
| Reference number: | | Population: | | |
| Province: Eastern (Date of commissioning: 10/1995 | Cape | Households served: Settlement type: | | |
| Technical data | | | | |
| Water source: Borehole | | Pump | usage data | |
| Treatment type: None | | Hrs/month: | | |
| Energy type: Electricity | | KI/month: | 3100 | |
| Number of taps | 3 | Head pumped (m): | | |
| Public: 20 Private: 0 | | Other notes: | | |
| Tariff data | | | 106 1046 | |
| Yard connection fee: | | Flat-rate (R/month): | | R 2.50 |
| Average % non payment: 20% | | Meter rate (R/kl): Pre-paid (R/kl): | | |
| Capital costs of construction | | | | |
| Mechanical / electrical: | | Total: | | R 251,558.00 |
| Civil works: | | Cost per capita: | | R 62.89 |
| Operational and maintenance of | | | | |
| Bulk purchase / Energy: | R 800.00 | | ly wages | |
| Water treatment: | | Operator / foreman : | | |
| Spare parts: | | Tariff collector: | | |
| Administration: | | Standpipe minders: Committee members: | | |
| Pump servicing: Civil works repair: | | Treasurer: | | |
| Transport cost: | | Store manager: | | |
| Replacement / emergency | 1 | Plumber / general | | |
| fund contribution: | | maintenance: | | |
| Costs of any other | The state of the s | Notes: | | |
| external support: | | | | |
| Other: | R 200.00 | | | |
| _ Total: | R 1,000.00 | Total: | | R 0.00 |
| Cash assets and liabilities | | | | |
| Hoppid bills | Descripti | on | An | nount |
| Unpaid bills Savings | | | | R 0.00 |
| Finance data for the last six mo | onths | Printella de la composición del composición de la composición de l | | Buche Deep |
| Month | Income | | Expenditure | |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 5 | | | | |
| 6 | | | | |
| Average | | R 0.00 | | R 0.00 |
| Typical external subsidies rece | ived per month | | | |
| Subsidy granting body | | Subsidy type | An | nount |
| | | | | R 0.00 |
| | | | | R 0.00 R 0.00 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 1,000.00 | Average month | | |
| Operational cost | | Excluding subsidy: | | R 0.32 |
| per capita / month: | R 0.25 | Including all subsidies: | | R 0.32 |

| WKC KURA | L WATER SUPPLY FINA PROJECT SUMM | | G PROJECT |
|--|-------------------------------------|--------------------------------------|-----------------------|
| Name: | Percy | Assessment date | : 23/04/1999 |
| Reference number: | | Population | : 4800 |
| | Eastern Cape | Households served | |
| Date of commissioning: | 23/04/1999 | Settlement type | : Villages |
| Technical data | | | 100 |
| Water source: | | | usage data |
| Treatment type: | | Hrs/month | |
| Energy type: | er of taps | KI/month | |
| Public: | | Head pumped (m). Other notes | : Lister Diesel |
| Private: | | outer riotos | Liotor Diodor |
| Tariff data | | | |
| Yard connection fee: | | Flat-rate (R/month) | R 5.00 |
| Average % non payment: | 50% | Meter rate (R/kl) Pre-paid (R/kl) | |
| Capital costs of constr | uction | | |
| Mechanical / electrical: | R 60,000.00 | Total | |
| Civil works: | R 610,387.00 | Cost per capita | R 139.66 |
| Operational and mainte | enance costs / month | | |
| Bulk purchase / Energy: | | Month | nly wages |
| Water treatment: | | Operator / foreman : | R 500.00 |
| Spare parts: | | Tariff collector | |
| Administration: | | Standpipe minders | |
| Pump servicing: Civil works repair: | | Committee members Treasurer | |
| Transport cost: | | Store manager | |
| Replacement / emergency | K 10.00 | Plumber / general | |
| fund contribution: | | maintenance | |
| Costs of any other | | Notes: | |
| external support: | | | |
| Other: | | | B 500 0 |
| Total: | R 510.00 | Total | R 500.00 |
| Cash assets and liabili | ties | 20,40 | |
| | Descripti | on | Amount |
| Unpaid bills Savings | | | R 0.00 |
| Finance data for the la | et eiv monthe | | |
| Month | Income | | Expenditure |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 6 | | | |
| Average | | R 0.00 | R 0.00 |
| | dies resolved nor mouth | | |
| Subsidy granti | dies received per month | Subsidy type | Amount |
| Cocarej granni | | 7,77 | R 0.00 |
| | | | R 0.00 |
| | | | R 0.00 |
| Monthly costs summar | ry | | |
| Total monthly cost: | | | ly unit cost of water |
| Operational cost | | Excluding subsidy | |
| per capita / month: | D 0 21 | Including all subsidies | R 0.94 |

| WRC RURA | L WATER SUPP PROJEC | The Control of the Control | | THE RESERVE AND ADDRESS OF THE PARTY OF THE | G PROJEC | T | |
|--|--|----------------------------|--|---|--|----------|-------|
| Reference number: Province: Date of commissioning: | Eastern Cape | | Assessment date: Population: Households served: Settlement type: | | 13000 1900 | | |
| Technical data | | | | | | | |
| | Weir on River None | | | Pump t Hrs/month: | sage data N/A | | |
| Energy type: | | | | KI/month: | | | |
| Numb Public: Private: | | | Head | d pumped (m): Other notes: | | | |
| Tariff data | | | 1 1440 | e salakti. | of the state of | | |
| Yard connection fee: Average % non payment: | | | Me | rate (R/month): eter rate (R/kl): Pre-paid (R/kl): | | R | 3.00 |
| Capital costs of constr | uction | | | | | | |
| Mechanical / electrical: Civil works: | | R 0.00 | _ | Total: | R | 2,500,00 | |
| COURTED AND ADDRESS OF THE SHARES OF | The second secon | 00,000.00 | C | ost per capita: | escand Societies | R 19 | 92.31 |
| Operational and maint | | onth | | | Marin Section | | |
| Bulk purchase / Energy: Water treatment: | | | Opera | | ly wages | R 1,40 | 20.00 |
| Spare parts: | | | Operator / foreman : Tariff collector: | | | R 80 | |
| Administration: | | | | pipe minders: | | 1100 | ,,,,, |
| Pump servicing: | | | | ttee members: | | | |
| Civil works repair: | | | | Treasurer: | | | |
| Transport cost: | | R 40.00 | | tore manager: | | | |
| Replacement / emergency | | | Plumber / general | | R 372.0 | | 72.00 |
| fund contribution: Costs of any other | | - | Notes: | maintenance: | | K 3/ | 2.00 |
| external support: | | | 140103. | | | | |
| Other: Total: | | R 40.00 | | Total: | | R 2,57 | 72.00 |
| BERTHARD CONTRACTOR OF THE SECOND | production and the state of | 11 40.00 | 1000 | 10101 | LCVALUE . | 112,01 | 2.00 |
| Cash assets and liabili | ties | Descripti | on | | Amo | unt | |
| Unpaid bills | | Descripti | 011 | | R 0.00 | | |
| Savings | Emergency fund | | | | | R 27,00 | |
| Finance data for the la | st six months | | | | | | |
| Month | Inco | me | | | Expenditure | | |
| 1 | | | 2,388.60 | | R 2,880.0 | | |
| 2 | | | 1,897.86 | | R 2,272.00 R 3,066.00 R 3,448.60 | | |
| 3 | | | 4,880.61 | | | | |
| 5 | | | 2,324.57 3,215.45 | | | R 3,10 | |
| 6 | | | 1,155.22 | | | | 91.34 |
| Average | | | 2,643.72 | | R 2,611.2 | | |
| Typical external subsid | dies received per | month | | N. C. H. M. | | | |
| Subsidy granti | | | Subsidy t | ype | Amo | | |
| | | | | | | | 0.00 |
| | | | | | | | 0.00 |
| | | Internal Resource | | | 0,000,000,000,000 | R | 0.00 |
| Monthly costs summar | A STATE OF THE PARTY OF THE PAR | | | | | | |
| Total monthly cost: | R | 2,612.00 | | erage monthl | | | |
| Operational cost | | | | uding subsidy: | | | 0.52 |
| per capita / month: | | R 0.20 | including | all subsidies: | | К | 0.52 |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM. | | ING PROJECT |
|---|--------------------------------------|------------------------------|---|
| Name: | Umtebe | | ate: 06/12/1998 |
| Reference number: | | Populati | |
| | Eastern Cape | Households serv | |
| Date of commissioning: | 09/1998 | Settlement ty | pe: Villages |
| Technical data | | | |
| Water source: | | | np usage data |
| Treatment type: | | | nth: 150 |
| Energy type: | | | nth: 600 |
| | er of taps | Head pumped (| |
| Public: Private: | | Other no | tes: Lister Diesel |
| na a trace in the processor of the con- | 0 | SALL CONSIDERATION OF STREET | |
| Tariff data | | | |
| Yard connection fee: Average % non payment: | 5% | | th): Households take turns to kl): buy diesel, & a list is kept. kl): O&M is similar. |
| Capital costs of constr | uction | | |
| Mechanical / electrical: | R 60,000.00 | To | tal: R 247,695.00 |
| Civil works: | R 187,695.00 | Cost per cap | |
| Operational and mainte | enance costs / month | | |
| Bulk purchase / Energy: | R 320.00 | Mo | nthly wages |
| Water treatment: | | Operator / forema | |
| Spare parts: | | Tariff collec | tor: |
| Administration: | | Standpipe minde | ers: |
| Pump servicing: | | Committee member | ers: |
| Civil works repair: | | Treasu | rer: |
| Transport cost: | R 10.00 | Store manag | ger: |
| Replacement / emergency | | Plumber / genera | I |
| fund contribution: | | maintenan | ice: |
| Costs of any other | | Notes: | |
| external support: | | | |
| Other: | R 50.00 | | |
| Total: | R 380.00 | Тс | tal: R 200.00 |
| Cash assets and liability | | | |
| | Descripti | on | Amount |
| Unpaid bills Savings | | | R 0.00 |
| Finance data for the las | et ely monthe | Bernelling and J | ALC: Alle or S |
| Month | Income | | Expenditure |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| Average | | R 0.00 | R 0.00 |
| Typical external subsid | dies received per month | | |
| A 1 11 11 | ng body | Subsidy type | Amount |
| Subsidy granting | | | R 0.00 |
| Subsidy granting | | | |
| Subsidy granting | | | R 0.00 |
| | | | |
| Monthly costs summar | | | R 0.00 R 0.00 |
| Monthly costs summar Total monthly cost: Operational cost | R 580.00 | Average more | R 0.00 R 0.00 |

| WKC RURA | L WATER SUPPLY FINA PROJECT SUMM | the state of the s | ELLIN | PROJECT | |
|---|-------------------------------------|--|------------|--------------------|------------|
| Name: | Bremodupo | | ent date: | 11/02/2000 | |
| Reference number: | | Po | pulation: | 4600 | |
| Province: | Northern Province | Households | served: | 438 | |
| Date of commissioning: | 10/1995 | Settlem | ent type: | Villages | |
| Technical data | | 1800 | | | |
| Water source: | | | | sage data | |
| Treatment type: | | | s/month: | | |
| Energy type: | | | I/month: | 1270.5 | |
| | er of taps | Head pum | | E SUM SEVA | |
| Public: Private: | | Oth | er notes: | 6.3kW, 2.5 l/s | |
| Tariff data | | | | Na iliani i | |
| Yard connection fee: | | Flat-rate (R | /month): | | R 10.00 |
| Average % non payment: | 70% | Meter rai | | | |
| Capital costs of constr | uction | 1601 | | 1001- | 1.46 |
| Mechanical / electrical: | R 40,000.00 | | Total: | R | 791,270.45 |
| Civil works: | R 751,270.00 | Cost pe | r capita: | | R 172.02 |
| Operational and mainte | enance costs / month | | | | |
| Bulk purchase / Energy: | R 450.00 | | | y wages | |
| Water treatment: | | Operator / foreman : | | | R 700.0 |
| Spare parts: | | | collector: | | |
| Administration: | 1 | Standpipe | | | |
| Pump servicing: | | Committee m | | | |
| Civil works repair: | R 104.00 | | easurer: | | |
| Transport cost: | R 70.00 | Plumber / ge | nanager: | | |
| Replacement / emergency fund contribution: | | | tenance: | | R 500.0 |
| Costs of any other | 1 | Notes: | orientos. | | 11 000.0 |
| external support: | | | | | |
| Other: | | | | | |
| Total: | R 624.00 | | Total: | | R 1,200.0 |
| Cash assets and liabilit | ties | | | | |
| | Descripti | on | | Amo | |
| Unpaid bills Savings | | | | | R 0.00 |
| Finance data for the las | st six months | 国籍中 4.50 | | | |
| Month | Income | | | Expenditure | |
| 1 | | 1,710.00 | | | R 725.00 |
| 2 | | 1,210.00 | | R 1,430.0 | |
| 3 | | 1,030.33 R 350.00 | | R 710.0 R 600.0 | |
| 5 | | R 350.00 1,790.33 | | | R 1,540.0 |
| 6 | | 1,910.00 | | R 1,540.0 | |
| Average | | 1,333.44 | | | R 917.5 |
| | lies received per month | 1990 | | | |
| Subsidy grantin | | Subsidy type | | Amo | unt |
| | | | | | R 0.00 |
| | | | | | R 0.00 |
| | | | | | R 0.0 |
| Monthly costs summar | у | | | | |
| Total monthly cost: | | | | unit cost of | |
| Operational cost | | Excluding | | | R 1.44 |
| per capita / month: | | Including all su | | | R 1.44 |

| WRC RURA | L WATER SUPPLY FIN PROJECT SUM | | | G PROJE | СТ |
|---|-----------------------------------|-------------------------------|---|----------------|---|
| Name: | Claremont | Ass | essment date: | 14/10/1999 | |
| Reference number: | c.663 | 7 | Population: | 1537 | |
| Province: | Northern Province | House | sholds served: | 95 | |
| Date of commissioning: | 11/07/1997 | Se | ettlement type: | Villages | |
| Technical data | AND CAMPAGES AND SECTION | | | | |
| Water source: | Borehole | T | Pump i | usage data | |
| Treatment type: | None | | Hrs/month: | 186.6 | |
| Energy type: | | 1 | KI/month: | 1075.2 | |
| | er of taps | Head | pumped (m): | 70 | |
| Public: | 18 | | Other notes: | | |
| Private: | 17 | | | | |
| Tariff data | | | | | |
| Yard connection fee: | | Flat-ra | ate (R/month): | | R 10.00 |
| Average % non payment: | 49% | | ter rate (R/kl): re-paid (R/kl): | | |
| Capital costs of constr | uction | | | | |
| Mechanical / electrical: | R 50,000.0 | 00 | Total: | | R 207,754.24 |
| Civil works: | R 157,754.0 | | ost per capita: | | R 135.17 |
| Operational and expires | nance costs / month | | 100000000000000000000000000000000000000 | | 19.19.14.25.48 |
| Operational and mainte | R 500.0 | vol. | Month | b. wanne | |
| Bulk purchase / Energy: | R 500.0 | | tor / foreman : | ly wages | R 1,900.00 |
| Water treatment: | | | ariff collector: | | R 1,900.00 |
| Spare parts: Administration: | | | | | B 20 0 |
| | | | pipe minders: | | R 20.00 |
| Pump servicing: | D SE | | tee members: | | B 200 0 |
| Civil works repair: | R 25.0 | | Treasurer: | | R 300.00 |
| Transport cost: | R 93.0 | | tore manager: | | |
| Replacement / emergency | | Plumb | er / general | | |
| fund contribution: | | Notes: | maintenance: | | |
| Costs of any other | | Notes: | | | |
| external support: | | 1 | | | |
| Other: Total: | R 618.0 | 50 | Total: | | R 2,220.00 |
| | | 70] | i otal. | | N 2,220.00 |
| Cash assets and liabilit | | ntine | | A- | |
| Unpaid bills | Descri | ption | | AI | R 0.00 |
| Savings | | | | | K 0.00 |
| Finance data for the las | st six months | | | | |
| Month | Income | | | | |
| 1 | | | R 420.00 | | R 458.00 |
| 2 | | R 1,005.00 | | | R 49.66 |
| 3 | | | R 700.00 | | R 536.49 |
| 4 | | R 2,091.00 | | | R 500.00 |
| | | R 1,471.00 | | | R 690.84 |
| 5 | | | R | | R 36.99 |
| 6 | | R 880.00 | | | |
| | | R 880.00 R 1,094.50 | | | |
| 6 Average Typical external subsid | lies received per month | R 1,094.50 | | se Habeth | R 378.66 |
| 6 Average Typical external subsid Subsidy grantir | ng body | R 1,094.50 Subsidy t | | Ar | R 378.66 |
| 6 Average Typical external subside Subsidy granting | ng body paymen | Subsidy t | | Ar | R 378.66 |
| 6 Average Typical external subside Subsidy granting | ng body | Subsidy t | | Ar | R 378.60 nount R 1,900.00 R 200.00 |
| 6 Average Typical external subside Subsidy grantin | ng body paymen | Subsidy t | | Ar | R 378.60 nount R 1,900.00 R 200.00 |
| 6 Average Typical external subside Subside Granting DWAF DWAF Monthly costs summar | paymen service | Subsidy to operator engine | | | R 378.66 nount R 1,900.00 R 200.00 R 0.00 |
| 6 Average Typical external subsidence Subsidence DWAF DWAF Monthly costs summar Total monthly cost: | paymen service | Subsidy to of operator engine | erage monthi | ly unit cost | R 378.66 nount R 1,900.00 R 200.00 R 0.00 |
| 6 Average Typical external subside Subside Granting DWAF DWAF Monthly costs summar | paymen service | Subsidy to operator engine | | ly unit cost o | R 378.66 nount R 1,900.00 R 200.00 R 0.00 |

| WRC RURAL | WATER SUPPLY FINA PROJECT SUMM | The second secon | NG PROJECT | |
|---|-----------------------------------|--|------------------------|-------|
| Name: F | airlie Halt | Assessment date | 20/10/1999 | 79.75 |
| Reference number: C | | Population | | |
| Province: N | lorthern Province | Households served | | |
| Date of commissioning: 2 | 1/05/1997 | Settlement type | e: Villages | |
| Technical data | | | 10,700, 17 18 | |
| Water source: B | 0.0.00 | | usage data | |
| Treatment type: N | | Hrs/month | | |
| Energy type: D | | | 1: 1555.2 | |
| Number Public: | of taps | Head pumped (m | | |
| Private: | | Other notes | 5: 3.0 VS | |
| Tariff data | | | | |
| Yard connection fee: | | Flat-rate (R/month |): R | 5.0 |
| Average % non payment: 6 | 2% | Meter rate (R/kl Pre-paid (R/kl | | |
| Capital costs of construc | ction | Hillipp Lin 2015 Rays | SHIP SHIP SHIP SHIP | ghi. |
| Mechanical / electrical: | R 40,000.00 | Tota | l: R 405,35 | 50.6 |
| Civil works: | R 365,350.00 | Cost per capita | R 14 | 44.5 |
| Operational and mainten | ance costs / month | rsts to a consultation of | PARK STORY | |
| Bulk purchase / Energy: | R 250.00 | Mont | hly wages | |
| Water treatment: | R 13.00 | Operator / foreman | : R 40 | 0.00 |
| Spare parts: | | Tariff collector | r. | |
| Administration: | | Standpipe minders | S: | |
| Pump servicing: | R 20.00 | Committee members | | |
| Civil works repair: | 2 400 00 | Treasure | | |
| Transport cost: | R 130.00 | Store manager | r. | |
| Replacement / emergency fund contribution: | | Plumber / general maintenance | | |
| Costs of any other | - | Notes: | 7. | |
| external support: | | 110100 | | |
| Other: | | | | |
| Total: | R 413.00 | Tota | l: R 40 | 00.0 |
| Cash assets and liabilitie | 15 | | | |
| | Descripti | on | Amount | |
| Unpaid bills Savings | | | R | 0.0 |
| Finance data for the last | six months | | | |
| Month | Income | | Expenditure | |
| 1 | | R 970.00 | R 656.0 | |
| 2 | | 1,020.00 | R 40 | |
| 3 | | R 825.00 R 795.00 | R 65 | |
| 5 | | R 465.00 | | |
| 6 | | R 280.00 | R 873 R 427 | |
| Average | | R 725.83 | R 61 | |
| Typical external subsidie | CARLES CONTRACTOR CONTRACTOR | HERE IN COLUMN TO SERVICE | | |
| Subsidy granting | | Subsidy type | Amount | |
| escary granding | | 777 | 7 11 11 10 10 11 | 0.0 |
| | | | | 0.0 |
| | | | R | 0.0 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 813.00 | Average month | nly unit cost of water | |
| rotal monthly cost. | | | | 0.00 |
| Operational cost | | Excluding subsidy | | 0.52 |

| WRC RURA | L WATER SUPPLY F | | 100 march 200 miles | The Street Street Street Control of the Control of | G PROJE | СТ |
|--|--|---------|---|---|---|----------------------------|
| Reference number: Province: | Name: Leokaneng Reference number: C.1.459 Province: Northern Province Date of commissioning: 30/09/1995 | | House | Population: holds served: ttlement type: | 2325 332 | |
| Technical data | | | | | | |
| Water source: Treatment type: Energy type: | Done | | Head | Pump of Hrs/month: KI/month: pumped (m): | 2560 | |
| Public: Private: | 21 | | | Other notes: | | |
| Tariff data | | | | | | |
| Yard connection fee: Average % non payment: | 71% | | Me | ite (R/month): ter rate (R/kl): re-paid (R/kl): | | R 5.00 |
| Capital costs of constr | uction | | | | | |
| Mechanical / electrical: Civil works: | R 40,000 R 298,000 | | Co | Total: ost per capita: | | R 338,000.00 R 145.38 |
| Operational and mainte | enance costs / month | Maj | | | Market S. | |
| Bulk purchase / Energy: | R 450 | 0.00 | | Month | ly wages | |
| Water treatment: Spare parts: Administration: Pump servicing: Civil works repair: | R 14 | 4.00 | Operator / foreman : Tariff collector: Standpipe minders: Committee members: Treasurer: | | | R 220.00 |
| Transport cost: Replacement / emergency fund contribution: Costs of any other external support: Other: | R 70 | 0.00 | | | | |
| Total: | R 534 | 4.00 | | Total: | | R 220.00 |
| Cash assets and liabili | 1 | | The Sup | e como | | |
| Cash assets and naom | | criptio | n | | I Ar | nount |
| Unpaid bills Savings | Savings | | | | | R 0.00 R 15,269.82 |
| Finance data for the las | st six months | | | | | |
| Month | Income | | | | Expenditure | |
| 1 2 3 4 | | F | R 580.52 R 791.30 R 522.34 R 383.61 | | R 189.00 R 280.00 R 60.00 R 300.00 | |
| 5 | | | R 173.92 | | | R 570.00 |
| 6 | | | 399.97 | | | R 220.00 |
| Average | | | 475.28 | | | R 269.83 |
| Typical external subsid | | | | State Sides | | |
| Subsidy granting | ng body | - 5 | Subsidy ty | /pe | Ar | R 0.00 R 0.00 R 0.00 |
| Monthly costs summar | | | | | | |
| Monthly costs summar Total monthly cost: | Annual Control of the | 1.00 | Av | erage month | ly unit cost | of water |
| Operational cost | 11.75 | - | | ding subsidy: | | R 0.29 |
| per capita / month: | | - 1 | | all subsidies: | | R 0.29 |

| WRC RURAL WAT | PROJECT SUMM | A STREET OF STREET STREET, STREET STREET, STREET STREET, STREE | 新加州山地市 海州 为 |
|---|-------------------------------|--|---------------------------|
| Name: Magul | cubu | Assessment date: | 02/12/1999 |
| Reference number: C.1.192 | | Population: | 3150 |
| Province: Northern | | Households served: | |
| Date of commissioning: 30/09/19 | 996 | Settlement type: | Villages |
| Technical data | | | |
| Water source: 2 Boreh | oles | | sage data |
| Treatment type: None | FT 1-1-14 | | Diesel = 160, Elect. = 11 |
| Energy type: Diesel & | | | Diesel = 70, Elect. = 0 |
| Number of tap Public: 43 | 5 | Head pumped (m): | bo4 Lister TSi, 10kW |
| Private: 0 | | Other notes. | Lister 131, TOKYY |
| Tariff data | William Land | 11806 Section 2 | 47-440h - 128-144 |
| Yard connection fee: | SERVICE PROJECT BEING SERVICE | Flat-rate (R/month): | R 10.0 |
| Average % non payment: 15% | | Meter rate (R/kl): Pre-paid (R/kl): | |
| Capital costs of construction | | 7.07 | |
| Mechanical / electrical: | R 80,000.00 | Total: | R 492,178.0 |
| Civil works: | R 412,178.00 | Cost per capita: | R 156.2 |
| Operational and maintenance | costs / month | | |
| Bulk purchase / Energy: | R 258.00 | Monthl | y wages |
| Water treatment: | | Operator / foreman : | R 480.0 |
| Spare parts: | | Tariff collector: | R 180.0 |
| Administration: | | Standpipe minders: | |
| Pump servicing: | | Committee members: | R 300.0 |
| Civil works repair: | R 221.54 | Treasurer: | R 360.0 |
| Transport cost: | R 144.00 | Store manager: | |
| Replacement / emergency fund contribution: | | Plumber / general | |
| Costs of any other | + | Maintenance: | |
| external support: | | 140105. | |
| Other: | | | |
| Total: | R 623.54 | Total: | R 1,320.0 |
| Cash assets and liabilities | | | |
| | Description | on | Amount |
| Unpaid bills | | | R 0.00 |
| Savings | | | R 21,938.00 |
| Finance data for the last six m | onths | | 25.00 |
| Month | Income | | Expenditure |
| 1 | | 3,915.50 | R 1,053.15 |
| 2 3 | | 5,031.53 2,121.28 | R 2,475.55 R 1,593.55 |
| 4 | | 3,802.50 | R 1,589.9 |
| 5 | | 3,727.54 | R 1,439.5 |
| 6 | | 4,353.04 | R 2,735.5 |
| Average | | 3,825.23 | R 1,814.5 |
| Typical external subsidies rec | eived per month | | |
| Subsidy granting body | | Subsidy type | Amount |
| | | | R 0.0 |
| | | | R 0.0 |
| | | | R 0.0 |
| Monthly costs summary | | 100 11 11 1032 | |
| Total monthly cost: | R 1,943.54 | | unit cost of water |
| Operational cost | | Excluding subsidy: | R 0.62 |
| per capita / month: | R 0.62 | Including all subsidies: | R 0.62 |

| WRC RURA | | UPPLY FINA | | | G PROJE | СТ |
|--|----------------|--------------|-----------------|---|---------------|------------------------------|
| Name: | Makweya | | Ass | essment date: | 30/09/1999 | |
| Reference number: | | | | Population: | 3258 | |
| | Northern Provi | nce | | eholds served: | | |
| Date of commissioning: | 15/10/1999 | | Se | attlement type: | Village | |
| Technical data | | | | | | |
| Water source: | Borehole | | | Pump | usage data | |
| Treatment type: | | r [| | Hrs/month: | | |
| Energy type: | | | | Kl/month: | 960 | |
| | er of taps | | Head | pumped (m): | | |
| Public: Private: | | | | Other notes: | TS3 Lister, | 4kW |
| Tariff data | 35,000 | or stars | March 1 | 0.00 | e indica i | |
| Yard connection fee: | | | Flat-ra | ate (R/month): | | R 8.00 |
| Average % non payment: | 64% | | Me | ter rate (R/kl): re-paid (R/kl): | | 14 0.04 |
| Capital costs of constr | uction | | | | | |
| Mechanical / electrical: | | R 40,000.00 | | Total: | | R 543,296.00 |
| Civil works: | | R 503,296.00 | | ost per capita: | | R 166.76 |
| 0 1 1 1 1 1 | | | | | | |
| Operational and mainte | enance costs | | 1500000 | | • | |
| Bulk purchase / Energy: | | R 520.00 | 0 | tor / foreman : | ly wages | D 500 00 |
| Water treatment: | | | | for / foreman : ariff collector: | | R 520.00 |
| Spare parts: Administration: | | | | pipe minders: | | |
| | | | | tee members: | | |
| Pump servicing: Civil works repair: | | - 1 | Commit | Treasurer: | | |
| Transport cost: | | R 195.00 | e | | | |
| Replacement / emergency | | K 195.00 | | tore manager: er / general | | |
| fund contribution: | | - 1 | Plumb | maintenance: | | |
| Costs of any other | | - | Notes: | maintenance. | | |
| | | - 1 | Notes: | | | |
| external support: Other: | | - 1 | | | | |
| Total: | | R 715.00 | | Total: | | R 520.00 |
| | | | Lincoln Lincoln | in his approces | bingilide ski | 11 020.00 |
| Cash assets and liabilit | ties | Descripti | on | | I Ar | nount |
| Unpaid bills " | | 2000.90 | | | | R 0.00 |
| Savings | | | | | | R 0.00 |
| Finance data for the las | st six months | | | | | |
| Month | | Income | | | Expenditure | , |
| 1 | | R | 1,110.00 | | | R 809.00 |
| 2 | | | R 890.00 | | | R 612.00 |
| 3 | | R | 1,146.00 | | | R 605.00 |
| 4 | | | 4,113.00 | | | R 1,325.65 |
| 5 | | | 1,740.00 | | | R 712.00 |
| 6 | | | 3,637.00 | | | R 1,162.99 |
| Average | | R | 2,106.00 | | | R 871.11 |
| Typical external subsid | | per month | 1040546 | | | the left |
| Subsidy granting | ng body | | Subsidy t | ype | Ar | mount |
| | | | | | | R 0.00 |
| | | 1 | | | | R 0.00 |
| | | | | | | R 0.00 |
| | | | | | | |
| Monthly costs summar | | | | | | |
| Total monthly cost: | | R 1,235.00 | | erage month | | |
| | | | Excl | erage month uding subsidy: all subsidies: | | of water R 1.29 R 1.29 |

| | PROJECT SUMM | ANT SHEET | SEC. 25.1 | GREET SERVICES |
|---|--|--|----------------|------------------------|
| | Mankotsana | Assessment date: | | |
| Reference number: C | | Population | | |
| | Iorthern Province | Households served | | |
| Date of commissioning: 1 | 1/1996 | Settlement type: | Village | |
| Technical data | | | | |
| Water source: 2 | | | usage data | B 0 - 100 |
| Treatment type: N | | Hrs/month: Kl/month: | | P 2 = 169 |
| Energy type: E Number | | Head pumped (m): | | P2 = 48 |
| Public: 9 | | Other notes: | | Jacuzzi |
| Private: 0 | - | Other Hotes | 18.5kW | 3.75kW |
| Tariff data | With the second | | | |
| Yard connection fee: | T | Flat-rate (R/month): | | R 5.0 |
| Average % non payment: 6 | 5% | Meter rate (R/kl): Pre-paid (R/kl): | | , , , , , |
| Capital costs of constru | ction | | | |
| Mechanical / electrical: | R 128,000.00 | Total | | R 876,760.0 |
| Civil works: | R 748,760.00 | Cost per capita: | | R 109.6 |
| Operational and mainten | ance costs / month | | | |
| Bulk purchase / Energy: | R 600.00 | Month | nly wages | |
| Water treatment: | | Operator / foreman : | | R 1,210.0 |
| Spare parts: | | Tariff collector: | | |
| Administration: | | Standpipe minders: | | |
| Pump servicing: | 5.00.00 | Committee members: | | D 005 0 |
| Civil works repair: | R 86.00 | Treasurer | | R 605.0 |
| Transport cost: | R 44.00 | Store manager | | |
| Replacement / emergency fund contribution: | | Plumber / general maintenance: | | |
| Costs of any other | | Notes: | | |
| external support: | | 140(65. | | |
| Other: | | | | |
| Total: | R 730.00 | Total | | R 1,815.0 |
| Cash assets and liabilitie | es de la companya de | | | |
| | Descripti | on | Алт | ount |
| Unpaid bills | | | | R 0.0 |
| Savings s | avings + stock | | | R 19,039.2 |
| Finance data for the last | six months | | | |
| Month | Income | | Expenditure | |
| 1 | | 3,527.00 | | R 1,957.9 |
| 2 | | 4,141.00 | | R 1,675.5 |
| 3 | | 4,650.00 | | R 11,071.7 |
| 4 | | 2,380.00 | | R 1,876.3 |
| 5 | | 2,755.00 | | R 2,864.4 |
| 6 Augraga | | 2,405.00 3,309.67 | | R 3,547.9 R 3,832.3 |
| Average | | 3,308.07 | | N 3,032.3 |
| Typical external subsidie | | Pubaidu basa | 1 A~ | nount |
| Subsidy granting DWAF | | Subsidy type f Eskom account | All | R 600.0 |
| Dittril. | r ayment c | Lanorri docodini | | R 0.0 |
| | | | | R 0.0 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 2,545.00 | Average month | ly unit cost o | f water |
| Operational cost | | Excluding subsidy | | R 0.5 |
| Operational cost | | - | | |

| WRC RURAL WATE | R SUPPLY FINA PROJECT SUMM | | | G PROJECT |
|--|-------------------------------|----------------------|-----------------------------------|---------------------------|
| Name: Maupye |) | Asse | ssment date: | 04/10/1999 |
| Reference number: C1195 | | | Population: | 796 |
| Province: Northern | Province | Housel | holds served: | 171 |
| Date of commissioning: 1996 | | Set | tlement type: | Village |
| Technical data | | | | |
| Water source: 2 Boreho | les | | Pump | usage data |
| Treatment type: None | | | Hrs/month: | 72 |
| Energy type: Diesel & : | Solar | | KI/month: | 400 |
| Number of taps | | Head | pumped (m): | 60 |
| Public: 26 | | | Other notes: | TSi mono, 6kW |
| Private: 0 | | | | Submersible, 1.1kW |
| Tariff data | | | | |
| Yard connection fee: | | | te (R/month): | |
| Average % non payment: 72% | | | er rate (R/kl): e-paid (R/kl): | |
| Capital costs of construction | | | | A PROPERTY AND A STATE OF |
| Mechanical / electrical: | R 60,000.00 | | Total: | R 165,000.00 |
| Civil works: | R 105,000.00 | Co | st per capita: | |
| Operational and maintenance c | oete / month | | | 1000000 |
| Bulk purchase / Energy: | R 500.00 | | Month | ly wages |
| Water treatment: | K 300.00 | Operator / foreman : | | |
| Spare parts: | | | ariff collector: | |
| Administration: | | | pipe minders: | |
| Pump servicing: | R 12.00 | | ee members: | |
| Civil works repair: | 11 12.00 | Treasurer: | | |
| Transport cost: | R 180.00 | Store manager: | | |
| Replacement / emergency | | Plumber / general | | |
| fund contribution: | | | maintenance: | |
| Costs of any other | | Notes: | | |
| external support: | | | | |
| Other: | | | | |
| Total: | R 692.00 | | Total: | R 320.00 |
| Cash assets and liabilities | | | | |
| | Descripti | on | | Amount |
| Unpaid bills | | | | R 0.00 |
| Savings | | | | R 23,740.00 |
| Finance data for the last six mo | onths | | | |
| Month | Income | | | Expenditure |
| 1 | | 1,100.00 | | R 1,536.77 |
| 2 | | 1,400.00 | | R 1,320.00 |
| 3 | | R 880.00 | | R 820.00 |
| 4 | | R 350.00 | | R 0.00 |
| 5 | | 1,490.00 | | R 590.00 |
| 6 Average | | R 192.00 R 902.00 | | R 560.00 R 804.46 |
| | | N 502.00 | | K 004.40 |
| Typical external subsidies rece Subsidy granting body | ivea per month | Subsidy ty | De | Amount |
| January Lawy | | 1 1 | | R 0.00 |
| | | | | R 0.00 |
| | | | | R 0.00 |
| Monthly costs summary | | | | |
| Total monthly cost: | R 1,012.00 | Ave | rage month | ly unit cost of water |
| Operational cost | | Exclu | ding subsidy: | R 2.53 |
| per capita / month: | R 1.27 | | all subsidies: | R 2.53 |

| WKC KUKA | L WATER SUPPLY FINA PROJECT SUMM | | | G PROJECT |
|---|-------------------------------------|---|-------------------------------------|--------------------------------|
| Name: | | | essment date: | 04/10/1999 |
| Reference number: | C.1.872 | | Population: | 1600 |
| Province: | Northern Province | House | holds served: | |
| Date of commissioning: | 28/02/1996 | Se | ttlement type: | Village |
| Technical data | Salati Color | | | |
| Water source: | 201011010 | | | sage data |
| Treatment type: | | | Hrs/month: | |
| Energy type: | | | KI/month: | |
| Public: | er of taps | Head | pumped (m): | Lister Tsi, 6.3kW |
| Private: | | | Other notes. | Lister 151, O.Skyy |
| Tariff data | | 100 | | and the result of the second |
| Yard connection fee: | | Flat-ra | ite (R/month): | R 10.00 |
| Average % non payment: | 71% | | ter rate (R/kl): re-paid (R/kl): | |
| Capital costs of constr | uction | Maria de | | |
| Mechanical / electrical: | R 40,000.00 | | Total: | R 327,846.00 |
| Civil works: | R 287,846.00 | Co | ost per capita: | R 204.90 |
| Operational and mainte | enance costs / month | (Bens | | |
| Bulk purchase / Energy: | R 498.00 | | Month | ly wages |
| Water treatment: | | Operator / foreman : Tariff collector: | | R 400.00 |
| Spare parts: | | | | |
| Administration: | | Standpipe minders: | | |
| Pump servicing: | R 85.00 | Committee members: Treasurer: | | |
| Civil works repair: | | | | |
| Transport cost: | R 170.00 | Store manager: Plumber / general maintenance: | | |
| Replacement / emergency | | | | |
| fund contribution: | | | | R 20.00 |
| Costs of any other | | Notes: | | |
| external support: | | | | |
| Other: | D 750 00 | | | D 100 0 |
| Total: | R 753.00 | ASSESSED TO | Total: | R 420.00 |
| Cash assets and liability | | | | |
| Unpaid bills | Descripti | on | | Amount R 0.00 |
| Savings | | | | R 16,000.00 |
| Finance data for the las | st six months | | | |
| Month | Income | | | Expenditure |
| 1 | | R 580.00 | | R 808.00 |
| 2 | | R 530.00 | | R 474.00 |
| 3 | | R 510.00 | | R 429.87 |
| 4 | | R 445.00 | | R 1,081.35 |
| 5 | | R 390.00 | | R 578.00 |
| 6 | | R 265.00 | | R 400.00 |
| Average | | R 453.33 | | R 628.54 |
| | lies received per month | 450000000 | | |
| Subsidy granting | ng body | Subsidy ty | /pe | Amount |
| | 1 | | | R 0.00 |
| | 1 | | | R 0.00 |
| | | 10000 | | R 0.00 |
| Monthly costs summar | | ancence. | | |
| Total monthly cost: | R 1,173.00 | | erage monthly iding subsidy: | y unit cost of water R 1.27 |
| Opportional and | | E 975 | ENDER SUPSITY | R 1.27 |
| Operational cost per capita / month: | | | all subsidies: | R 1.27 |

| | PROJECT S | | | | G PROJECT |
|--|--|------------|----------------------|-----------------------------------|----------------------|
| Name: | Morapalala | | Asse | ssment date: | 12/03/2000 |
| Reference number: | | | | Population: | 2300 |
| | Northern Province | | | nolds served: | |
| Date of commissioning: | 20/01/1995 | | Set | tlement type: | Village |
| Technical data | | | | | |
| Water source: | | | | | usage data |
| Treatment type: | | - 1 | | KI/month: | P1 = 95.3, P2 = 83.7 |
| Energy type: | er of taps | - | Head | | P1 = 90, P2 = 65 |
| Public: | | _ | ridad | Other notes: | |
| Private: | 0 | | | | |
| Tariff data | | | 7 5 6 6 6 | | |
| Yard connection fee: | | | Flat-rat | e (R/month): | R 5.00 |
| Average % non payment: | 46% | | | er rate (R/kl): e-paid (R/kl): | |
| Capital costs of constr | uction | | | | 100 100 100 |
| Mechanical / electrical: | R 60,0 | 000.000 | | Total: | R 295,000.00 |
| Civil works: | R 235,0 | 000.00 | Co | st per capita: | R 128.26 |
| Operational and mainte | enance costs / mont | h . | Transfer | | |
| Bulk purchase / Energy: | | | | | ly wages |
| Water treatment: | | | Operator / foreman : | | |
| Spare parts: | | - 1 | | | |
| Administration: | | - 1 | | | |
| Pump servicing: Civil works repair: | | 140.00 | | | |
| Transport cost: | | 160.00 | | | |
| Replacement / emergency | K | 100.00 | | | |
| fund contribution: | | | | | |
| Costs of any other | | ı | | | |
| external support: | | | | | |
| Other: | - | 200.00 | | | |
| Total: | C. DOCCUE E ENGLISHMENT | 300.00 | related to the last | Total: | R 0.00 |
| Cash assets and liabili | | | | | |
| Unpaid bills | D | escription | on | | Amount R 0.00 |
| Savings | stock & savings | | | R 16,827.00 | |
| Finance data for the la | st six months | | | | |
| Month | Income | 3 | T | | Expenditure |
| 1 | | | 1,150.00 | | R 232.00 |
| 2 | | | 1,150.00 | | R 229.16 |
| 3 | | | 1,095.00 | | R 304.00 |
| 4 | | | R 950.00 | | R 40.00 |
| 5 | | | R 520.00 | | R 3,466.91 |
| 6 Average | | | R 510.00 R 895.83 | | R 40.00 |
| Average | | NE CHILI | 1000.00 | BRACK. | K 710.00 |
| Typical external subsic Subsidy grantii | of the same of the | | Subsidy ty | De | Amount |
| DWAF Substitution | * * | erator w | | - | 7 11100111 |
| DWAF | | kom acc | | | 1 |
| | | | | | R 0.00 |
| Monthly costs summar | у | | | | |
| | | 300.00 | Ave | rage monthl | y unit cost of water |
| Total monthly cost: | R 300.00 | | Excluding subsidy: | | |
| Operational cost per capita / month: | | R 0.13 | | ding subsidy: all subsidies: | R 0.06 |

| THE ROLL | and the second second second second | UPPLY FINA | | A STATE OF THE PARTY OF THE PAR | 1 | 电影等 |
|---|-------------------------------------|--------------|----------------------|--|-------------|--|
| Name: | Phiring | | Asse | essment date: | 07/01/1999 | |
| Reference number: | C.1.170 | | | Population: | 3264 | |
| Province: | Northern Provi | nce | | holds served: | | |
| Date of commissioning: | 12/1996 | | Se | ttlement type: | Village | |
| Technical data | | | | | | |
| Water source: | Borehole | | | Pump i | usage data | |
| Treatment type: | | | | Hrs/month: | | |
| Energy type: | | | | KI/month: | | |
| | er of taps | | Head | pumped (m): | | |
| Public: Private: | | | | Other notes: | 5.bkvv | |
| | - TOO | The second | lucio se k | 19 54 1900 00 180 | | 1000000 |
| Tariff data | | | Flot se | to /D/monthly | | DEO |
| Yard connection fee: | | | | ite (R/month): | | R 5.00 |
| Average % non payment: | 28% | | | ter rate (R/kl): re-paid (R/kl): | | |
| Capital costs of constr | auction | 0.046.20.036 | Marconst | | | 7 September 1 |
| Mechanical / electrical: | | R 30,000.00 | | Total: | | R 622.549.5 |
| Civil works: | | R 592.550.00 | Co | st per capita: | | R 190.7 |
| | 201724-00103 | | elicia senti | | Lewinin | 11.000000000 |
| Operational and mainte | | | | S | | |
| Bulk purchase / Energy: Water treatment: | | R 1,100.00 | Operator / foreman : | | ly wages | |
| Spare parts: | | | | ariff collector: | | |
| Administration: | | | | pipe minders: | | |
| Pump servicing: | | | | ee members: | | |
| Civil works repair: | | | Commi | Treasurer: | | |
| Transport cost: | | R 96.00 | St | ore manager: | | |
| Replacement / emergency | | 14 00.00 | | er / general | | |
| fund contribution: | | R 320.00 | | maintenance: | | |
| Costs of any other | | | Notes: | mai no no no no . | | |
| external support: | | | | | | |
| Other: | | | | | | |
| Total: | | R 1,516.00 | | Total: | | R 0.0 |
| Cash assets and liabilit | ties | | | | | |
| * | | Description | on | | Ar | nount |
| Unpaid bills | | | | | | R 0.00 |
| Savings | Stock | | | | | R 1,600.00 |
| Finance data for the las | st six months | | | | | |
| Month | | Income | | | Expenditure | , |
| 1 | | | R 490.00 | | | R 1,086.00 |
| 2 | | R | 3,107.00 | | | R 1,096.00 |
| 3 | | | 1,005.00 | | | R 1,177.07 |
| 4 | | | 1,384.00 | | | R 1,177.5 |
| 5 | I | | 1,514.00 | | | R 1,129.84 |
| 6 | | | R 245.00 | | | R 1,384.16 |
| Average | | R | 1,290.83 | | | R 1,175.10 |
| | dies received | | Players. | | 986 | |
| | | | Subsidy ty | /pe | Ar | nount |
| Typical external subside Subside granting | ng body | | | | | |
| | ng body | | | | | |
| | ng body | | | | | R 0.00 |
| | ng body | | | | | R 0.00 |
| Subsidy granting | y | | | | | R 0.00 R 0.00 |
| Subsidy granting Monthly costs summar Total monthly cost: | y | R 1,516.00 | Av | erage monthl | y unit cost | R 0.00 R 0.00 |
| Monthly costs summar | y | R 1,516.00 | Ave | erage monthl ding subsidy: all subsidies: | y unit cost | R 0.00 R 0.00 R 0.00 of water R 0.56 R 0.56 |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | Street Section 19 Co. No. 10 | All The State of t | G PROJECT | |
|--|-------------------------------------|---|--|------------------------|----------------------------|
| Reference number: | Northern Province | House | Population: holds served: ttlement type: | 1308 218 | |
| Technical data | AUG Liber - Pilotina e i Brad | | emilia Schin | | |
| Water source: | Borehole | 200000000000000000000000000000000000000 | Pump | usage data | |
| Treatment type: Energy type: | None Diesel | | Hrs/month: Kl/month: | 139 930.7 | |
| Public: Private: | | Head | Other notes: | 50 Lister TSi, 10kW | |
| Tariff data | | | | | i i i |
| Yard connection fee: Average % non payment: | | Met | ite (R/month): ler rate (R/kl): re-paid (R/kl): | | R 7.00 |
| Capital costs of constr | uction | PHOTO: | the St | | |
| Mechanical / electrical: | | | Total: | | |
| Civil works: | R 195,963.00 | Cc | st per capita: | R 1 | 88.05 |
| Operational and mainte | enance costs / month | | | | |
| Bulk purchase / Energy: | | | Month | ly wages | |
| Water treatment: Spare parts: Administration: Pump servicing: Civil works repair: Transport cost: | R 104.00 R 83.00 | Stand Commit | or / foreman : ariff collector: pipe minders: tee members: Treasurer: ore manager: | R 1 | 150.00 |
| Replacement / emergency fund contribution: Costs of any other external support: Other: Total: | | | er / general maintenance: Total: | R1 | 150.00 |
| Cash assets and liability | ties | | | | |
| | Descripti | on | | Amount | |
| Unpaid bills Savings | stolen engine | | | | 000.00 384.47 |
| Finance data for the las | st six months | | | | |
| Month | Income | | | Expenditure | |
| 2 | | 1,064.00 1,050.00 | | R 792.00 R 650.00 | |
| 3 | | R 854.00 | | R 825.0 | |
| 4 | | 1,548.00 | | R 1,310.0 | |
| 5 | | 1,064.00 | | R 700.00 | |
| 6 | R | 1,126.00 | | R 1,0 | 50.00 |
| Average | R | 1,117.67 | | R 8 | 387.83 |
| Tunical external subsis | dies received per month | | | | |
| Typical external subsit | nes received per month | | | | |
| Subsidy grantin | | Subsidy ty | /ре | Amount | |
| | | Subsidy ty | /pe | 1 | R 0.00 |
| Subsidy granting | ng body | Subsidy ty | pe | 1 | R 0.00 |
| Subsidy granting Subsidy granting Subsidy granting Subsidy granting Subside Su | ng body | | | | R 0.00 R 0.00 |
| Subsidy granting | ng body | Ave | | y unit cost of water | R 0.00 R 0.00 R 0.00 |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | | ING PROJE | CI | |
|---|--|-------------------------------|-----------------|----------------------|--|
| Name: | Seokodibeng | Assessment d | ate: 17/01/200 | 0 | |
| Reference number: | | Populat | ion: 4000 | | |
| Province: | Northern Province | Households serv | red: 572 | | |
| Date of commissioning: | 31/03/1995 | Settlement ty | pe: Village | | |
| Technical data | | | | | |
| Water source: | 2 Boreholes | | np usage data | | |
| Treatment type: | | | nth: P1= 167.3 | P2 = 176.5 | |
| Energy type: | | | nth: 4000 | | |
| | er of taps | Head pumped (| | 65 | |
| Public: Private: | | Other no | tes: 4kW | 10kW | |
| Tariff data | | | | | |
| Yard connection fee: | V 10 10 10 10 10 10 10 10 10 10 10 10 10 | Flat-rate (R/mon | th)- | R 10.0 | |
| Average % non payment: | 87% | Meter rate (R Pre-paid (R | /kl): | K 10.0 | |
| Capital costs of constr | uction | | | ver all length | |
| Mechanical / electrical: | R 80,000.00 | To | otal: | R 307,684.0 | |
| Civil works: | R 227,684.00 | Cost per cap | | R 76.9 | |
| Operational and mainte | enance costs / month | | | | |
| Bulk purchase / Energy: | | Mo | nthly wages | | |
| Water treatment: | | Operator / forema | an: | | |
| Spare parts: | | Tariff collec | | | |
| Administration: | | Standpipe mind | | | |
| Pump servicing: | | Committee member | | | |
| Civil works repair: | B 70.00 | Treasu | | | |
| Transport cost: | R 70.00 | Store manag | | | |
| Replacement / emergency fund contribution: | | Plumber / genera maintenar | | | |
| Costs of any other | | Notes: | IUG. | | |
| external support: | | | | | |
| Other: | | | | | |
| Total: | R 970.00 | To | otal: | R 0.0 | |
| Cash assets and liabili | ties | | | | |
| | Description | on | , A | Amount | |
| Unpaid bills Savings | | | | R 0.00 | |
| Finance data for the las | st six months | | | | |
| Month | Income | | Expenditur | Expenditure | |
| 1 | | 1,015.00 | | R 1,408.00 | |
| 2 | | 1,563.00 | | R 997.0 | |
| 3 | | 1,225.00 | | R 1,040.0 | |
| 4 | | R 335.00 | | R 1,611.0 R 560.0 | |
| 5 | l , | R 55.00 | | R 913.0 | |
| Average | | R 140.00 R 722.17 | | R 1,088.1 | |
| | | | | 1,000.1 | |
| Subsidy grantin | dies received per month | Subsidy type | | mount | |
| ouchay grand | | | | R 0.0 | |
| | | | | R 0.0 | |
| | | | | R 0.0 | |
| Monthly costs summar | v | | | | |
| Total monthly cost: | | Average mor | nthly unit cost | of water | |
| | | Excluding subs | | R 0.2 | |
| Operational cost | I | Excidenting sous | - J. | 110.2 | |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | | The state of the s | G PROJE | СТ | |
|--|---|--|--|--------------|----------------------------|--|
| Reference number: | Northern Province | Househ | sment date: Population: olds served: lement type: | 226 | | |
| Technical data | | | HILDER! | | | |
| Water source: | | | | usage data | | |
| Treatment type: Energy type: | Electricity | | Hrs/month: Kl/month: | 2720 | | |
| Public: Private: | | | oumped (m): Other notes: | | | |
| Tariff data | sesta i ji bi alee aa aa aa aa a | | | | | |
| Yard connection fee: Average % non payment: | | Mete | e (R/month): r rate (R/kl): -paid (R/kl): | | R 10.00 | |
| Capital costs of constr | uction | | | | | |
| Mechanical / electrical: Civil works: | R 30,000.00 | Cos | Total: t per capita: | | R 622,549.00 R 251.03 | |
| Operational and mainte | enance costs / month | | | | | |
| Bulk purchase / Energy: | | | Month | ly wages | | |
| Water treatment: Spare parts: Administration: Pump servicing: Civil works repair: Transport cost: | R 81.50 | Operator / foreman: Tariff collector: Standpipe minders: Committee members: Treasurer: 00 Store manager: | | | R 400.00 | |
| Replacement / emergency fund contribution: Costs of any other external support: Other: Total: | | | / general naintenance: Total: | | R 400.0 | |
| | | | TOtal. | | N 400.0 | |
| Cash assets and liabili | | | | A- | | |
| Unpaid bills | Descripti Eskom bill | on | | A | Amount R 13,272.73 | |
| Savings | Lakolii biii | | | | R 0.00 | |
| Finance data for the la | st six months | | | | | |
| Month | Income | | | Expenditure | | |
| 1 | | R 740.00 | | R 740.0 | | |
| 2 | | R 870.00 | | R 620.0 | | |
| 3 | | R 920.00 | | | R 620.00 | |
| 4 | | R 800.00 | | | R 600.00 | |
| 5 | R 910.00 | | | R 900.0 | | |
| 6 | | R 1,260.00 | | | R 1,200.00 | |
| Average | | R 916.67 | | | R 780.00 | |
| # T | dies received per month | | 1510 1731 | | | |
| Subsidy granting | ng body | Subsidy typ | e | Ar | mount | |
| | | | | | R 0.00 R 0.00 R 0.00 | |
| Monthly south sure | | | | | N V.V | |
| Monthly costs summar | Access to the contract of the | Aver | age month | ly unit cost | of water | |
| Total monthly costs | | AVE | aue monun | y unit cost | oi water | |
| Total monthly cost: | R 1,551.50 | | | | P A E | |
| Total monthly cost: Operational cost per capita / month: | | Exclud | ling subsidy: | | R 0.5 | |

| WRC RURAL WA | TER SUPPLY FINA PROJECT SUMM | The State of Control of the State of the Sta | G PROJECT | |
|--|---------------------------------|--|-------------------------|--|
| Name: Vhu | | Assessment date: | 11/12/1999 | |
| Reference number: 635 | | Population: | 550 | |
| Province: North | ern Province | Households served: | 120 | |
| Date of commissioning: 10/06 | 3/1996 | Settlement type: | Village | |
| Technical data | | organical designation of | | |
| Water source: Borel | | | usage data | |
| Treatment type: None | | Hrs/month: | | |
| Energy type: Diese | | KI/month: | | |
| Number of t Public: 18 | aps | Head pumped (m): Other notes: | | |
| Private: 0 | | Outer Hotel. | | |
| Tariff data | Contract of the second | and the state of | Port Care Topic III | |
| Yard connection fee: | | Flat-rate (R/month): | R 10.00 | |
| Average % non payment: 18% | | Meter rate (R/kl): Pre-paid (R/kl): | | |
| Capital costs of constructio | n | | We see Mintered | |
| Mechanical / electrical: | R 40,000.00 | Total: | R 251,023.00 | |
| Civil works: | R 211,023.00 | Cost per capita: | R 456.41 | |
| Operational and maintenance | ce costs / month | | | |
| Bulk purchase / Energy: | R 520.00 | Month | ly wages | |
| Water treatment: | | Operator / foreman : | | |
| Spare parts: | | Tariff collector: | | |
| Administration: | | Standpipe minders: | | |
| Pump servicing: Civil works repair: | R 33.00 | Committee members: Treasurer: | | |
| Transport cost: | R 20.00 | Store manager: | | |
| Replacement / emergency | N 20.00 | Plumber / general | | |
| fund contribution: | | maintenance: | | |
| Costs of any other | | Notes: | | |
| external support: | | | | |
| Other: | | | | |
| Total: | R 573.00 | Total: | R 450.00 | |
| Cash assets and liabilities | | | | |
| Liid bill- | Descripti | on | Amount | |
| Unpaid bills Savings | | | R 0.00 R 21,953.00 | |
| | | | N 21,800.00 | |
| Finance data for the last six | | | | |
| Month | Income | R 990.00 | Expenditure R 920.00 | |
| 1 2 | | 1,173.00 | R 1,083.00 | |
| 3 | | 1,422.05 | R 970.00 | |
| 4 | | 1,230.00 | R 1,034.39 | |
| 5 | | 1,023.00 | R 1,062.00 | |
| 6 | | 1,020.00 | R 859.00 | |
| Average | R 1.143.01 | | R 988.07 | |
| Typical external subsidies re | eceived per month | | | |
| Subsidy granting bod | | Subsidy type | Amount R 0.00 | |
| | | | | |
| | | | R 0.00 | |
| THE COLUMN THE SERVICE SHEET S | | | R 0.00 | |
| Monthly costs summary | | | | |
| Total monthly cost: | R 1,023.00 | | ly unit cost of water | |
| Operational cost per capita / month: | | Excluding subsidy: | | |
| per capita / month: | R 1.86 | Including all subsidies: | R 1.14 | |

| WRC RURA | L WATER SUPPLY FINA PROJECT SUMM | | | G PROJE | СТ |
|---|-------------------------------------|------------|---|---------------------------------------|----------------------------|
| Reference number: | Northern Province | House | Population: Population: Pholds served: ettlement type: | 2000 300 | |
| Technical data | 20.02.1000 | | therries type. | Timege | |
| Water source: | Borehole | | Pump | usage data | |
| Treatment type: Energy type: | None | | Hrs/month: Kl/month: | 158.6 | |
| Numbe | er of taps | Head | d pumped (m): | | |
| Public: Private: | | | Other notes: | Lister 152 | |
| Tariff data | | 11111 | | | The great |
| Yard connection fee: Average % non payment: | | Me | ate (R/month): ter rate (R/kl): re-paid (R/kl): | | R 11.00 |
| Capital costs of constr | uction | Marian. | | Williams. | |
| Mechanical / electrical: | | | Total: | | R 505,496.00 |
| Civil works: | R 465,496.00 | C | ost per capita: | I I I I I I I I I I I I I I I I I I I | R 252.75 |
| Operational and mainte | | | | | |
| Bulk purchase / Energy: | R 450.00 | | tor / foreman : | ly wages | R 250.00 |
| Water treatment: Spare parts: | | | ariff collector: | | R 250.0 |
| Administration: | | | pipe minders: | | 14 250.0 |
| Pump servicing: | R 64.00 | | tee members: | | |
| Civil works repair: | | | | | |
| Transport cost: | | | | | |
| Replacement / emergency | | | er / general | | |
| fund contribution: | | | maintenance: | | |
| Costs of any other | | Notes: | | | |
| external support: | | | | | |
| Other: | | | | | |
| Total: | R 683.00 | | Total: | | R 500.0 |
| Cash assets and liability | | | | | |
| Henrid bille | Descript | ion | | Ar | mount R 0.00 |
| Unpaid bills Savings | | | | | R 19,000.20 |
| Finance data for the las | | | | | |
| Month | Income | 0.404.00 | | Expenditure | |
| 2 | | 2,134.00 | | R 1,784.7 | |
| 2 | | 1,064.00 | | | R 2,282.66 R 836.24 |
| 4 | | 1,102.00 | | | R 950.0 |
| 5 | | 2,229.00 | | | R 2,042.5 |
| 6 | , | R 921.00 | | | R 1,403.9 |
| Average | R | 1,856.50 | | | R 1,550.02 |
| | | | | mainten. | |
| Typical external subsid | dies received per month | | | | |
| Typical external subsic Subsidy grantir | dies received per monthing body | Subsidy t | уре | - Ar | mount |
| | | Subsidy t | уре | Ar | R 0.0 |
| | | Subsidy t | уре | Ar | R 0.00 R 0.00 |
| | | Subsidy t | ype | Ar | R 0.00 R 0.00 |
| Subsidy grantir | ng body | Subsidy t | уре | Ar | R 0.00 R 0.00 |
| Subsidy granting Monthly costs summar Total monthly cost: | ng body | Av | erage month | ly unit cost | R 0.00 R 0.00 R 0.00 |
| Subsidy granting | ng body Py R 1,183.00 | Av Excl | | ly unit cost | R 0.00 R 0.00 R 0.00 |

A Summary of Data Requirements for the WRC Rural Water Cost and Tariff Model

| V | VRC RURAL V | | THE RESERVE AND ADDRESS OF THE PERSON NAMED IN | ARIFF MODEL | | |
|--|--------------------------------------|------------------|--|--|---|--------------|
| | | Data Requirer | | | | |
| | | Project S | ummary | | | |
| Project name: | | | | Water source: | borehole / river / t | tulk / other |
| Population of area: | | | | | | _ |
| No. of households: | | | | Energy source: | gravity / diesel / Es | kom/other |
| Analysis name / number: Analysis date: | | | Wate | r treatment type: | | |
| Analysis date. | | Domand As | | r beautient type. | | |
| | | Demand As | | | | |
| | nnection type(s): | public stand | tpipe / institutional / c | ommercial / yard tank | / yard tap / house / o | ther |
| Average number of house | s served by each connection type: | | | | | |
| Number of connects | | | | | | |
| Planned consumption per | | | | | | |
| conn | ection type (l/day): | | | | | |
| in the model | ts values are given | % b | ransmission loss | es budgetted for: | | 9/. |
| | Can | ital Cost (min | | _ | | 76 |
| | | | | | iled breakdown is o | referable. |
| Mechanical / | Electrical works: | R | | Note: A more detail see page 3 for more | re detailed requirem | ents |
| | Civil works: | K | | | | > |
| Additional costs (BP, I | | | | Grant amount: | <u></u> | |
| If Grant Finance | e, then require | | at (minimum | | K | |
| | Asset Kep | lacement Cor | st (minimum i | | | |
| | | Date com | | Design life | | |
| Mechanical / | Electrical works: | | | | Note: A more detail breakdown is prefe | |
| | | | | | page 3 | racie, see |
| Additional costs (BP, I | SA, OTT, P&G): | | | L | | |
| | 0 | | gn life default year: | | | |
| Cost composed | | ad Cost (fill in | Cost component | | Monthly o | noet. |
| Cost component | Monthly cost | | | | Monthly 6 | OST |
| Office staff wages | | vvater | | ances/expenses | | |
| Book-keeper/administrator Other (fill in role and wage) | | | | ty guard's wages phone, taxi fares | | |
| Other (IIII In role and wage) | | | onery and compu | | | |
| | | Statis | | e electricity costs | | |
| Office Rent | | lneur | ance premiums a | | | |
| Field staff wages | | msur | ance premions a | Vehicle costs | | |
| Tariff collector | | | Vehicle li | cence/Insurance | | |
| Standpipe minder | | | Vernore ii | Maintenance | | |
| Meter reader | | | | Fuel | | |
| Operator | | | | Other | | |
| Other (fill in role and wage) | | | Rasic costs | and line rentals: | | |
| | | Cos | t of Public or Priv | | | |
| | | | Cost of | Pre-Paid Tokens | | |
| | | Production | on Cost | | | |
| Pump number | Pump type | | % of ki demand | Pumping head | Pump efficiency | |
| T unip number | (electric / diesel) | (litres/sec) | pumped | (m) | (default value) | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| kWhr ceiling for block 1: | | Unit cost | rate for block 1; | R | | |
| | | Unit cost | rate for block 2: | R | Diesel cost: | R/I |
| Bulk water cost (R/kl): | | Treat | ment cost (R/kl): | | | |

| WRC RUR | AL WATER SUPPLY (| COST & TARIFF | MODEL | | |
|---|---------------------------------------|-------------------|-------------------|------------------------|-------------|
| | Data Requiremen | ts Guide | | | |
| | Repair and Mainen | ance Cost | | | |
| Simplified information requirements: Monthly aggreg | | | | | |
| Local labour costs | Materials costs | | | Outsourced work: | |
| Plumber: | Materials and spare parts: | | | Plant costs: | |
| General maintenance: | Tools: | | Spe | cific transport costs: | |
| Other: | Other: | | Automa | ted dispensing units: | |
| Additional casual or specialist labour: | | | As | sociated other costs: | |
| | | | | | |
| Detailed information requirements: Monthly costs (N | ote: Inputted as an Annua | Amount into the | model) | | |
| Delines monaton requirements, monthly coats pr | I I I I I I I I I I I I I I I I I I I | | f repair / mainte | nance | |
| | Additional casual or | Materials & spare | | Specific transport | Other costs |
| System component requiring maintenance and repair | | parts | | costs | |
| Mechanical/Electrical works | | | | | |
| Pump engine/motor | | | | | |
| Electrical controls | | | | | |
| Other | | | | | |
| Civil works | | | | | |
| Bulk system | | | | | |
| Water collection structure, (spring protection, borehole, | | | | | |
| weir, dam) | | | | | |
| Pumphouse | | | | | |
| Water treatment facility | | | | - | |
| Water treatment facility cleaning | | | | | |
| Bulk main | | | | | |
| Distribution system | | 1 | 1 | 1 | |
| Primary reservoir | | | | | |
| Secondary reservoirs (break pressure, balancing) | | | | | |
| Reservoir cleaning | | | | | |
| Primary reticulation network | | | | | |
| Secondary reticulation network | | | | | |
| Meters | | | | | |
| Bulk meter | | | | | |
| Consumer meter | | | | | |
| Connections | | | | | |
| Public tapstand | | | | | |
| Yard tank | | | | | |
| Yard tap | | | | | |
| House connection plumbing | | | | | |
| Institutional connection plumbing | | | | | |
| Commercial connection plumbing | | | | | |
| Miscellaneous | | | | | |
| Water office | | | | | |
| Other | | | | | |
| | Support and Mento | rship Cost | | | |
| | Hours | Hourly rate | Material cost | Transport Cost | Other |
| Bulk Supply (Net Cost) | | Troday rate | motorio dost | | 0010 |
| Environmental Management | | | | | |
| Facilitation | | | | | |
| Implementing Agents' costs | | | | | |
| Project Management | | | | | |
| Water Quality Monitoring Programme | | | | | |
| Reticulation Supply | | | | 1 | |
| Training | | | | 1 | |
| | Tariff Calcula | ation | | | |
| | | JUOI1 | | T | |
| Flat rate (R/household, connnection): | K | | - | % Non-payment: | * |
| Valuenatria cata (D.b/): | E2 | | | one tariff (see model) | |

WRC RURAL WATER SUPPLY COST & TARIFF MODEL Data Requirements Guide **Useful Information (optional)** Capital Cost Asset Replacement Cost A more detailed breakdown of 'Capital Cost' and 'Asset Replacement Cost' is preferable but Design life of item Unit Quantity Unit cost Date Item (Default years given) not essential Commissioned (R) Mechanical/Electrical works 10 Pump installation(s) 15 Electrical controls sum 10 Other Civil works Bulk system Water collection structures, (spring protection, 15 borehole, weir, dam) Pumphouse 40 sum 10 Water treatment facility sum 30 Bulk main km Distribution system 40 Primary reservoirs kI 40 Secondary reservoirs (Break pressure, balancing) kI 40 Primary reticulation km Secondary reticulation 40 km Meters sum 15 Bulk meters Consumer meters sum 5 Connections 20 Public tapstands sum 20 Yard tanks sum (calculated 20 Yard taps sum automatically 20 House connections in model) 20 Institutional connections sum 20 Commercial connections sum Miscellaneous Water office sum 30 Other 15

Additional costs

Feasibility Study and Business Plan (BP) Institutional & Social Development (ISD) Operation, Training & Transfer (OTT)

Attachment

Model contained in Disk attached to the cover

The Model is in Microsoft Excel 97 Format.

Other related WRC reports available:

Institutional arrangements and support services required for sustainable community water supply

Van Schalkwyk A

The main objective of this project was to initiate establishment of an effective and efficient institutional structure for the operation, maintenance and management of rural water supply schemes. The study found that the link between the district councils and communities was weak and there was inadequate capacity to address all the water service functions. It was found that tribal authorities had considerable influence in many areas and they played an important role in the enforcement of payment for services. They can play a role in facilitating communication between the district municipalities and communities. Most rural water supply schemes were operated and maintained by DWAF and water boards. The billing and revenue collection depended on the level of service, tariff and payment method. A flat-rate tariff was usually used for communal standpipes, while yard and house connections were charged a usage rate.

Prepaid meters were preferred for rural areas because they reduce the management costs. The Bakenberg local municipality located near Potgietersrus was used to apply the experience gained from this project.

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