

## 10.0 FINANCIAL, ECONOMIC AND SOCIAL EVALUATION

### 10.1 INTRODUCTION

This section provides for the financial, economic and social evaluation of Wundanyi Urban Water Supply. The financial viability analysis is only useful for indicative purposes only. It is contended that projects of this nature should rely more on economic and social viability. These two aspects are given more emphasis in the evaluation.

### 10.2 INSTITUTIONAL MANAGEMENT COSTS

To obtain the desired results from the rehabilitation of the Wundanyi water supply, there will need for new institutional arrangement. This will be supported by a change in management style. This involves substantial investment, which is taken as part of the cost of the project. The financial costs of undertaking this exercise are summarised in Table 10.1.

**Table 10-1: Wundanyi Institutional Development Costs**

No.	Activity	Bases of cost estimate	Estimated cost (Ksh.)
1	Hold consensus building workshop	(a) Travel refreshments and honorarium for 50 participants at SH. 5,000 /= per participant	250,000
		(b) Consultants facilitation costs and travel	700,000
		(c) Transport and related expenses for ministry staff	200,000
2	Develop and register the trust instrument	Legal and follow up effort	50,000
3	Management Contract	Appoint local expert to support the institutional rehabilitation process for the 3 year period	39,600,000
4	(a) Identify water supply and sewerage infrastructure and estimate cost	Standard infrastructural valuation procedures	2,000,000
	(b) Identify and value other assets.		
5	Develop staffing and financial plans for the new organisation	25 working days at Sh. 40,000 per w/day	1,000,000
6	Develop operations manual	20 working days at Sh. 30,000 per day	600,000
7	Operational Support	Vehicles, motor cycles, computers and software, office equipment	
8	Provide initial working capital to the new organisation	Average annual billings for the last 3 years	3,000,000
	Sub -total		47,400,000
	Contingency (10%)		4,740,000
	Total		52,140,000

It is held that the key problem in the town's water supply system is management weakness. Institutional support is recommended as the foundation of improving the nature and efficiency of management.

### 10.3 WATER TARIFFS

The scheme is subject to the tariff regime legally set by the Minister of Water. The legal tariffs are as indicated in the Table 10.2.

**Table 10.2: URBAN WATER TARIFFS**

	Charge (Kshs.)
<b>PART I - GENERAL</b>	
(a) Where no meter is installed, a monthly charge of	200
(b) Where a meter installed, the charges will be as follows:	
(i) Where the amount of water sold through the meter in any one month does not exceed 10 cubic metres (minimum charge)	200
(ii) Where the amount of water sold through the meter in any one month is more than 10 cubic metres but does not exceed 20 cubic metres, the charge per cubic metre in excess of 10 cubic metres	25
(iii) Where the amount of water sold through the meter in any one month is more than 20 cubic metres but does not exceed 50 cubic metres, the charge per cubic metre in excess of 20 cubic metres	30
(iv) Where the amount of water sold through the meter in any one month is more than 50 cubic metres but does not exceed 100 cubic metres, the charge per cubic metre in excess of 50 cubic metres	45
(v) Where the amount of water sold through the meter in any one month is more than 100 cubic metres but does not exceed 300 cubic metres, the charge per cubic metre in excess of 100 cubic metres	75
(vi) Where the amount of water sold through the meter in any one month is more than 300 cubic metres the charge per cubic metre in excess of 300 cubic metres	100
c) Where water is sold through a meter at a kiosk, the charge per cubic metre	15
d) Where water is sold by retail at a kiosk per unit of 20 litres or part thereof, the charge per	2
e) For the bulk sales to an undertaker for resale, the charge per cubic metre	15
<b>PART II - BOARDING SCHOOLS</b>	
1. A school with a permissible water demand not exceeding 600 cubic metres per month, the charge per cubic metre	20
2. A school with a permissible water demand not exceeding 1200 cubic metres per month, the charge per cubic metre	25
3. Any other learning institution with a permissible water demand of 1200 cubic metres per month, the charge per cubic metre	25
4. The charge per cubic metre of water consumed in excess of permissible water demand	45

Source: Kenya Subsidiary Legislation, 1999: Legal Notice No. 174

The tariff apply only to those who have formal access to water. Those with no access to water and who acquire water from vendors pay about Ksh10.00 per 20lt or Kshs500 per M<sup>3</sup>. This, for all practical purposes, is a very high charge and has a dramatic effect on the household disposable income. A computation based

on the water consumers distribution and billing in Wundanyi gives an average billing of Kshs.42,31 per M<sup>3</sup>.

#### **10.4 FINANCIAL COSTS OF REHABILITATION**

The financial cost for rehabilitation works for Wundanyi water supply amounts to Kshs.185 million. These are composed of the costs of rehabilitation water supply amounting to Kshs.133 million (Table 4.4) and those of institutional reform amounting to Kshs.52 million (Table 10.1).

#### **10.5 ECONOMIC COSTS OF REHABILITATION**

The economic costs for the rehabilitation of Wundanyi water supply have been taken to be the total financial costs plus the incremental costs of households to connect to the mains. An average of 1,500 additional households will be connected at the cost of Kshs.1,500 per household. The resultants additional costs will be Kshs.2,250,000 bringing total economic costs to Kshs.148 million.

#### **10.6 FINANCIAL BENEFITS FROM REHABILITATION**

The main benefit of the rehabilitation plan will be institutional strengthening of the town's water supply system. This will result in enhancement of management. The observable outcomes will be increased water supply, reduction of water losses and improvement in the revenue collection efficiency. The benefits will accrue under the following assumptions:

1. The management Consultant is in place at the beginning of Year 1 and involved for it period of 48 months
2. The distribution network and metering would be rehabilitated/replaced during the first year of the management involvement.
3. Staff levels, remuneration and requirements are as proposed by the recommended Wundanyi organization chart.
4. The working capital to kick-start the process is available.
5. The appropriate infrastructure to support operations (transport, computers and software requirements and office space ) is available.

The benefits will occur as follows:

##### **10.6.1 Revenue from Extra Water Sold**

The scheme is designed to produce an average of 1,536 CBW per day. It currently produces 720 CBW per day. Projected demand will reach 1,583 CBM per day in 10 years. Increased management efficiency with rehabilitation will improve water production to design capacity from the third year of rehabilitation. This will improve water revenues by an average of Kshs.12.6 million per annum.

### **10.6.2 Reduction in Unaccounted for Water (UfW)**

The average UfW has been determined to be 53.61%. The average tariff rate of Kshs.42.31 per CBM is used for Wundanyi.

Assuming that the management consultant has the piping system replaced/repared and the billing under control within the first year, and this should result in UfW being reduced to 25% during year 1 and 2 and then sustained to not exceed 20% during years 3 – 7, then to 10% during years 8-10.

Reduction in UfW will result in revenue improvement averaging Kshs.3.7 million per annum.

### **10.6.3 Improvement in Collection Efficiency**

Collection efficiency for the last three years averaged 53.95%. No change is anticipated in the first year. Improved collection efficiency to 87% in year 2 is expected as a result of improved services. The efficiency will change to 95% as the billing system is enhanced through computerization from year 3 to 10.

Improved collection efficiency will improve cash flows by an average of Ksh.3.8 million per annum.

### **10.6.4 Improvement in Sewerage Coverage Revenue**

No benefits are calculated from this source.

## **10.7 ECONOMIC BENEFITS FROM REHABILITATION**

In identifying the benefits, the way to be consistent and accurate is to look at all people conceivably affected by the program and ask how much better off they will be as a result of the expected water and sanitation rehabilitation exercise in the town. In order to give a precise estimation of the social benefits accruing to each individual category, a number of assumptions are made in each approach.

The major focus for this study is on three broad categories of social benefits that are assumed to accrue to the household within a situation of an improved water and sanitation system. These are;

- Social/economic benefits (hereby referred to as opportunity costs) of alternative uses of time previously used for fetching water by the household over along distance.
- Social benefits enjoyed by the household due to better health for water users and their families.
- Social benefits accruing from a reduction in health costs

#### **(1) Valuation of economic benefits of time saved.**

The methodology used in the calculation of these benefits is founded on a number of assumptions. These assumptions include;

- i. The minimum amount of water required by each household to meet basic sanitary requirement is 100L per day. Therefore at the cost of Kshs 10 per a 20L jerrican of raw water, they would have to spend an average of Kshs 50 per day on water.
- ii. Assuming that the water source is one km away, it means that it would take on average a minimum of 30 minutes per trip to fetch a 20L jerrican of water. Consequently, to get the minimum daily water requirement of 100L (i.e. 5x20L jerrican) it would take 2.5 hours.
- iii. Assuming that a household earns an average minimum daily wage rate of Kshs 150 for an eight-hour normal working day, it is then possible to calculate the opportunity cost of fetching water in terms of man-hours spent and converting this to money units. The loss is  $(2.5/8 \times \text{Kshs } 150) = \text{Ksh.47}$  per household per day. The annual total loss per household is  $\text{Ksh.47} \times 365 \text{ days} = \text{Ksh.17,155}$ . For Wundanyi, the terrain gives additional handicap with a weighting of 1.4. The cost per household is therefore Kshs.24,017 per annum.

**(2) Economic benefits of better health for users and their families.**

Assumptions.

In analyzing the benefits accrued to an individual, the team considered the opportunity cost of falling sick due to a water and sanitation related problem. The study however from the outset acknowledges lapses in data capture.

Given the health data on Wundanyi, on average, each household losses 50 productive days due to the dilapidating effects water related ailments, earning a mean daily average wage rate of Kshs.150 per person per day, it then follows that the total loss per household will be  $\text{Kshs.150} \times 50 = \text{Kshs.7,500}$  per annum. This is the benefit that would accrue to the users with improvement in water delivery.

**(3) Economic benefits from reduction in Health costs.**

Assumptions:

According to the findings of the Welfare Monitoring Survey II of 1994, the budget share of household income spent on health care is 1.8%. Assuming that 80% of this income goes to sanitation related ailments, and given that the average mean monthly household income for Wundanyi is Kshs.3,526.10, it implies that the household spends Kshs.50.80 on this type of ailments per household per month. The total expenditure by per household in the town is  $\text{Kshs.50.80} \times 12 = \text{Kshs.609.60}$  per annum.

**Table 10.2 Summary of Economic Benefits derived for Wundanyi Town**

<b>Nature Benefits</b>	<b>Derived Benefits in Kshs Per Household per annum</b>
Economic benefits of time saved from fetching water from source	24,017
Economic benefits of better health for users and their families	7,500
Economic benefits in reduced health cost	610
<b>Total benefits per household per annum</b>	<b>32,127</b>

### 10.8 ABILITY TO MEET O&M COSTS

The water supply will be able to raise enough incremental revenue to cover operating and maintenance costs. The net contribution margin is projected to average Kshs.12.8 million per annum.

### 10.9 FINANCIAL EVALUATION.

Preliminary project evaluation of the proposed Water Supply rehabilitation project should be undertaken in compliance with the financial and economic viability of the project. The overall results of the financial evaluation of Wundanyi Town Water Supply Schemes are summarised in **Table 10-3**. An average discount rate of about 4%, which reflect the current cost of soft loans to Kenya is used for the evaluation. The base evaluation is for a period of 10 years.

**Table 10- 3 Financial Evaluation of Wundanyi Town Water Supply**

Financial Evaluation					
FIRR		NPV		RER	
Rate	Viability	Kshs.	Viability		Viability
-10%	N/V	(72,535,591)	N/V	0.750	N/V
N/V	=	Not Viable			

The results of the financial evaluation given in the Table 10.3 indicate that the Town Water Supply of Wundanyi is not financially viable, based on the current tariff and a 10-year project life. The NPV of Kshs.(72,535,591) shows that even after rehabilitation of the Water Works the supply will not be able to recover the initial cost of the Investment by year 10.

The financial internal rate of return (FIRR) of -10% and below the hurdle rate of 4%. The revenue – expenditure ratio (RER) is .750 indicating the project not fully fully able to cover all its costs.

However, as the results of the sensitivity analysis below shows, the results need to be interpreted cautiously.

### 10.9.1 Financial Sensitivity Analysis

It is generally agreed that evaluation a water utility over a ten-year period may be too ambitious. Most water utility investments are expected to indicate positive returns from 25 to 30 years after investment. In this case the project was financially evaluated using the following scenarios:

Case 1: The project is has a life of 15 years

Case 2: The project is has a life of 15 years but costs increase by 15% (Investment + O&M)

Case 3: The project is has a life of 15 years and is financed by Grant

In carrying out the above analysis we assume that the cash flow at the end of year 10 is maintained in the additional periods. The results of this analysis are presented in Table 10.4

**Table 10.4: Financial Sensitivity Analysis for Wundanyi Water Supply**

	Base Case	Case1	Case2	Case3
	Project has a life of 10 years	Project has a life of 15 years	Project has a life of 15 and Investment Cost and O&M increase by 15%	Case 1 but Project financed by Grant
FIRR	-10%	0%	-3%	0%
NPV	(72,535,591)	(32,928,636)	(69,928,162)	2,867,047
RER	0.7503	1.0099	0.8782	1.0099
	N/V	N/V	N/V	N/V
N/V	=	Not Viable		
FV	=	Financially Viable		

The project becomes is only financially viable over the more realistic time frame of 15 years only when financed by Grant. The project is, however, very sensitive to cost changes.

## 10.10 ECONOMIC EVALUATION

The results of the economic evaluations are summarized in Table 10.5, which shows that the rehabilitation costs for Wundanyi Town Water Supply are justifiable with a fair acceptable economic rate of return. An average discount rate of about 4%, which reflect the current cost of soft loans to Kenya is used for the evaluation.

The project is evaluated using:

- (a) a rate of EIRR (Economic Rate of Return)
- (b) a value of NPV (Net Present Value)
- (c) a ratio of CBR (Cost Benefit Ratio)

**Table 10- 5 Economic Evaluation of Wundanyi Town Water Supply**

Economic Evaluation					
EIRR		NPV		CBR	
Rate	Viability	Kshs.	Viability		Viability
7%	EV	19,107,044	EV	0.826	EV
EV	=	Economically Viable			

The project is economically viable with a high EIRR against the hurdle rate of 4%.

The positive NPV value of Kshs.19,107,044 makes the project economically very attractive. The project is also able to cover its costs comfortably with a cost-benefits ratio (CBR) of 0.826.

### 10.10.1 Economic Sensitivity Analysis

An economic sensitivity analysis was performed to determine whether changed circumstances would affect the viability of the project. The following assumptions have been made for the sensitivity analysis.

Case 1: Investment costs increase by 15%

Case 2: O&M costs increase by 15%

Case 3: Both investment costs and O&M increase by 15%

The results of the sensitivity analysis are presented in Table 10.6



**Table 10.6: Economic Sensitivity Analysis for Wundanyi Water Supply**

	Base Case	Case1	Case2	Case3
		Increase Investment Cost by 15%	Increase O&M by 15%	Increase both costs by 15%
EIRR	7%	3%	6%	2%
NPV	19,107,044	(6,758,795)	11,075,734	(14,790,105)
CBR	0.826	0.917	0.858	0.949
	EV	N/V	EV	N/V
EV	=	Economically Viable		

The project is very sensitive to changes in the cost structure. It becomes economically unviable when investment costs increase. It nevertheless stands well against any changes in operating costs.

### 10.11 SOCIAL EVALUATION

There is no doubt that society values water due to its effect on social welfare. In this study the two main issues considered were full time availability of clean water and the impact of water on public sanitation and health. Residents in the urban area were requested, through a rapid assessment survey, to specify the relative importance they attach to each of these two aspects.

In all the cases, were full time availability of clean water was considered to be of very greater importance, with a weighting of 94% by residents surveyed. The residents were willing to pay a higher tariff to have availability of water guaranteed. This means that it might be probable for tariff increases to be justified and hence enhance the financial viability of the project.

The residents were quite clear in their minds that clean water impacts positively on public sanitation and health. On health issues, the response indicated that 96% of disease incidences suffered at the local level should be eliminated by the supply of clean water. Again, residents were willing to pay a premium to mitigate against the health effects of non-availability of clean water.

## **11 IMPLEMENTATION PROGRAMME FOR PROPOSED PLANS**

### **11.1 WATER SUPPLY REHABILITATION**

The proposed implementation schedule for rehabilitating the Wundanyi water supply system is given as Figure 11.1.

### **11.2 WASTEWATER AND SANITATION REHABILITATION**

There are no proposed plans for wastewater and sanitation rehabilitation.

### **11.3 UTILITY MANAGEMENT PLAN**

The proposed implementation schedule for rehabilitating the Wundanyi water supply system is given in figure 11.1

### **11.4 LEGAL AND INSTITUTIONAL FRAMEWORK**

The transitional arrangements from the current ownership and operation of the Urban Water Supply to the operations of the Trust Corporation will be structured as follows;

- (a) Develop consensus among important stakeholders on the proposed approach to the operations of Wundanyi Urban Water Supply Service (the Trust Corporation). This is best achieved through a stakeholder workshop.
- (b) Appoint members of the Trust from identified stakeholders
- (c) Prepare the constituting instrument for Wundanyi Urban Water Supply Service. This can be done concurrently with activities (a) and (b) above. Registration, however, must await stakeholder consensus. On achievement of consensus on the proposed approach, present the Trust Instrument and registration forms to the Registrar of Trusts at AGs Chambers and ensure registration of the Trust Corporation.
- (d) Concurrently with (a), (b) and (c) above, carry out an inventory of the water supply system infrastructure of Wundanyi Urban Water Supply System. Assign estimated value to these assets. Carry out a valuation of all other assets of Urban Water Supply including equipment, vehicles, furniture, fittings and loose assets.
- (e) Develop organisational structures and staffing plans for the new organisation;
- (f) Complete the financial plan for the new organisation;

Figure 11.1

**STUDY OF INSTITUTIONAL IMPROVEMENTS AND REHABILITATION OF WATER SUPPLY AND SEWERAGE SYSTEMS FOR 10 LOCAL TOWNS IN KENYA  
IMPLEMENTATION SCHEDULES OF PROPOSED PLANS  
WUNDANYI WATER SUPPLY AND SEWERAGE REHABILITATION WORKS AND O&M**

Ref	Activity description	Duration in months	MONTH																																																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43										
<b>A</b>	<b>REHABILITATION WORKS</b>																																																						
1	Appoint consultant for rehabilitation works	3	■	■	■																																																		
2	Feasibility study, detailed design	7			■	■	■	■	■	■	■																																												
3	Tendering procedures, award and negotiations	9										■	■	■	■	■	■	■	■	■	■	■																																	
4	Construction	12																																																					
5	Defects Liability Period	12																																																					
<b>B</b>	<b>O&amp;M</b>																																																						
6	Appoint management consultant	3	■	■	■																																																		
7	Establish consumer data base/billing system	4			■	■	■	■																																															
8	Management and staff training	12			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■																																
9	Meter replacement and repair	15			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
10	Other recommended action plan activities	24			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

Agree on:

- (i) Lease, transfer or sale of infrastructural assets and other assets by GOK and Wundanyi Town Council to the Trust Corporation;
- (ii) Transfer or recruitment of the existing staff to the new organisation. Agree also on the retirement package or the transfer within the Ministry of staff not absorbed in the new organisation;
- (iii) Arrange financial support to the new organisation.
- (g) Develop the operations manual for Wundanyi Urban Water Supply Service;
- (h) Ensure all the assets, staff and financial resources are in place in the new organisation (necessary transfers / acquisitions made)

These activities and time frames are illustrated in **Table 11.1**

**Table 11.1: Wundanyi Water Supply Service – Transitional arrangements and time frame.**

No.	Activity	Month	1	2	3	4	5	6	7	8	9	10	11	12
1.	Hold consensus building workshop		●	---	---	▶★								
2.	Appoint Board of Trustees		●	---	---	▶★								
3.	Develop and present for registration the Trust Instrument		●	---	---	▶★								
4.	Identify and make an inventory of water and sanitation infrastructure assets and estimate their value. Identify and estimate the value of other assets.					●	---	---	▶★					
5.	Develop structures and staffing plans						●	---	---	▶★				
6.	Prepare financial plan for the Trust						●	---	---	▶★				
7.	Agree on: (i) Lease, transfer or sale of assets (ii) Transfer or recruitment of staff (iii) Financial support					●	---	---	---	---	▶★			
8.	1.1 DEVELOP OPERATIONS MANUALS							●	---	---	▶★			
9.	Assets, staff and financial resources in place											★		
10.	Wundanyi Water Supply Service operational												★	
Key:	1.2 EVENT	1.3 EVENT DEADLINE	●	---	▶	★								

## 11.5 FINANCIAL PLAN

### 11.5.1 Business Plan

The summarized business plan for Wundanyi town is given in Table 11.3. The specific feature of interest is that the utility will be able to fully cover its operating and maintenance costs. The plan indicates also very health net cash flows from year to year. If these are reinvested into the system, then the residents of the town can be guaranteed a reliable water supply for many years to come. However, the achievements of the predictions indicated in this business plan are strictly contingent upon there being the appropriate institutional framework for the town. This will call for a change in management style and structures that will facilitate the delivery of the set intent.

### 11.5.2 Financing Plan

It is assumed that the rehabilitation costs will be composed of four components: Institutional Strengthening, Professional Input for works, Water Supply and Sanitation. These financial costs of the project are assumed to be incurred as follows:

**Table 11-2: Financing Plan - Wundanyi TOWN WATER SUPPLY**

	1	2	3	4	Total
	Kshs	Kshs	Kshs	Kshs	Kshs
Institutional Development Costs	8,580,000	14,520,000	14,520,000	14,520,000	52,140,000
Consultancy Fees for Works (20% of works)	6,638,436	11,064,060	4,425,624	-	22,128,120
Water Supply Rehabilitation	33,192,180	55,320,300	22,128,120	-	110,640,600
Sanitation Rehabilitation	-	-	-	-	-
Total Overall Project Cost	48,410,616	80,904,360	41,073,744	14,520,000	184,908,720

The total cost of rehabilitation is Kshs.185 million approximately. These costs are spread over a four-year period. The working capital and the institutional set-up costs must be availed at the beginning of the rehabilitation plan. It should be noted that the financial evaluation has been based strictly on the cost of rehabilitation.

Table 11-2: BUSINESS PLANS FOR Wundanyi TOWN WATER SUPPLY

## CASH FLOWS

Year	1	2	3	4	5	6	7	8	9	10
<b>REVENUE GENERATED</b>										
Revenue from Extra Water Sold	7,560,966	8,821,127	12,601,610	12,601,610	12,601,610	12,601,610	12,601,610	12,601,610	12,601,610	12,601,610
Revenue from Unaccounted for Water	3,181,165	3,181,165	3,737,119	3,737,119	3,737,119	3,737,119	3,737,119	4,293,072	4,293,072	4,293,072
Savings from Collection Efficiency	-	3,116,688	3,871,106	3,871,106	3,871,106	3,871,106	3,871,106	3,871,106	3,871,106	3,871,106
Revenue from Sewerage Charges	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>10,742,132</b>	<b>15,118,981</b>	<b>20,209,835</b>	<b>20,209,835</b>	<b>20,209,835</b>	<b>20,209,835</b>	<b>20,209,835</b>	<b>20,765,788</b>	<b>20,765,788</b>	<b>20,765,788</b>
<b>Expenditures (Kenya Shilling)</b>										
<b>Transport &amp; Staff Related Expenses</b>	1,933,584	2,721,416	3,637,770	3,637,770	3,637,770	3,637,770	3,637,770	3,737,842	3,737,842	3,737,842
<b>O&amp;M</b>	2,148,426	3,023,796	4,041,967	4,041,967	4,041,967	4,041,967	4,041,967	4,153,158	4,153,158	4,153,158
<b>Postage</b>	40,820	57,452	76,797	76,797	76,797	76,797	76,797	78,910	78,910	78,910
<b>Telephone</b>	97,753	137,583	183,909	183,909	183,909	183,909	183,909	188,969	188,969	188,969
<b>Purchase of meters</b>	176,171	247,951	331,441	331,441	331,441	331,441	331,441	340,559	340,559	340,559
<b>Stationery</b>	117,089	164,797	220,287	220,287	220,287	220,287	220,287	226,347	226,347	226,347
<b>Fuel &amp; Gas</b>	542,478	763,509	1,020,597	1,020,597	1,020,597	1,020,597	1,020,597	1,048,672	1,048,672	1,048,672
<b>Current O&amp;M Costs</b>	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)	(2,178,100)
<b>Incremental O&amp;M Costs</b>	<b>2,878,221</b>	<b>4,838,404</b>	<b>7,334,669</b>	<b>7,334,669</b>	<b>7,334,669</b>	<b>7,334,669</b>	<b>7,334,669</b>	<b>7,596,356</b>	<b>7,596,356</b>	<b>7,596,356</b>
<b>Surplus(Deficit)</b>	<b>7,863,910</b>	<b>10,180,576</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>13,169,432</b>	<b>13,169,432</b>	<b>13,169,432</b>
<b>Average Tariff (Kshs/m3)</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>	<b>42.31</b>
<b>Investment Costs</b>										
<b>Net Cash Flow</b>	<b>7,863,910</b>	<b>10,180,576</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>12,875,166</b>	<b>13,169,432</b>	<b>13,169,432</b>	<b>13,169,432</b>
<b>Cumulative Cash Flow</b>	<b>7,863,910</b>	<b>18,044,487</b>	<b>30,919,652</b>	<b>43,794,818</b>	<b>56,669,983</b>	<b>69,545,149</b>	<b>82,420,314</b>	<b>95,589,746</b>	<b>108,759,177</b>	<b>121,928,609</b>

## **12 CONCLUSIONS AND RECOMMENDATIONS**

### **12.1 WATER SUPPLY REHABILITATION**

#### **12.1.1 Operational performance of existing systems**

The operational performance of the existing water treatment plants could be improved. Current problems include:

- Lack of an operational laboratory that has resulted in estimated chemical dosing.
- There is no standby pumping plant in the event of power failure.
- Filters do not have adequate media and backwashing is poorly done thus affecting water quality.
- The high elevation distribution area is poorly served due to lack of pumping plant.

The treatment plants are capable of producing water of potable quality when operated correctly.

#### **12.1.2 Rehabilitation requirements**

The recommended rehabilitation measures are summarised in table 12.1

### **12.2 LEGAL AND INSTITUTIONAL GUIDELINES**

Wundanyi water supply, like the other nine towns covered in this study, is served by the Ministry of Environment and Natural Resources. The water operator is the District Water Officer (DWO).

In recommending a viable institutional and legal framework for Wundanyi Urban water Supply, the following guidelines were utilized: Government policy on the water sector Government policy on the restructuring and privatisation of public enterprises and the eligibility criteria for grant funding within the sector by Government of Japan. Other considerations include; sustainability of water supply and sanitation services; improved access to community, especially women; community participation and involvement; speed of incorporation in view of current strict deadlines and consistency with existing incorporation laws; - public orientation as opposed to private sector orientation.

The legal framework for water sector management in Kenya include: The Water Act, Cap. 372; The National Water Policy set out in Sessional Paper No. 1 of 1999; and the National Water Master Plan. The institutional framework for the water sector involves: the Ministry of Environment and Natural Resources; the National Water Conservation and Pipeline



Table 12.1 - Schedule of prioritised rehabilitation works - Wundanyi

Item	Unit	Ref	Component	Condition	Repairs needed	Comments	Priority
1.	Wundanyi Raw water Intake	1.1	Trash rack and screens	Good	None	Essential to prevent foreign materials from being drawn into the low lift pumps	NA
		1.2	Structure	Good	None	Prone to flooding due to low elevation Ensure all electric fittings are wall mounted	NA
		1.3	Pumps Duty pumps & motors (2 no.) Stand-by diesel pump & engine	operational out of order	routine maintenance replace with new	Controls and cabling layout is untidy should include switchgear	Low Very High
	Wesu raw water intake	1.4	Gravity weir intake and pipe to TW's	Good	None	Flows are very low, none released downstream	NA
2	Wundanyi Treatment streams	2.1	2 no. 16m <sup>3</sup> /hour horizontal flow sedimentation tank Alum dosing equipment Soda Ash dosing equipment	Manual dosing Manual dosing	Replace Replace	Gravity dosers are preferred Gravity dosers are preferred	High High
		2.2	2 no. 16m <sup>3</sup> /hour rapid gravity filter Filter media Underdrains	Poor To be inspected	Replace Inspect & replace as necessary	Affects performance of filter	High Medium
	Wesu treatment works	2.3	2 no. composite filtration units Structure Filter media Alum dosing equipment Soda Ash dosing equipment	Good Poor Manual dosing Manual dosing	Replace Replace Replace Replace	Affects performance of filter Gravity dosers are preferred Gravity dosers are preferred	NA High High High
3	Wundanyi Backwash tank	3.1	60m <sup>3</sup> backwash tank Structure	Good	None		NA
	Wesu treatment works	3.2	Backwash system Tank Backwash pump	Poor not operational	Replace Replace	without backwash the filter will not perform well	High High
4	Wundanyi Clear water tanks	4.1	200m <sup>3</sup> clear water tank Structure (Reservoir no. 1) Chlorine dosing equipment	Good Manual dosing	None Replace	Gravity dosers are preferred	High
	Wesu clear water tanks	4.2	1 x 60m <sup>3</sup> & 1 x 90m <sup>3</sup> tanks Structure Chlorine dosing equipment	Good Manual dosing	None Replace	Gravity dosers are preferred	High
5	Wundanyi Treated water pumps	5.1	Pumps Duty pumps & motors (2no.) Stand-by diesel pumps & engine Controls & cabling	operational out of order Untidy	routine maintenance replace with new Rehabilitate	should include switchgear	NA Very High Low
6	General	6.1	Pipes & valves	Good	None		Medium
7	Wundanyi treatment works buildings	7.1	Chemical store Alum and soda ash Chlorine Laboratory	Poor Poor Poor	Repair leaking roof Repair leaking roof Complete rehabilitation and re-equip	Chemicals need dry storage to prevent damage Equip with chemicals and apparatus for carrying out daily tests. Train technicians	High High High
8	Meters	8.1	Bulk meters Wesu Treatment works Reservoirs	not operational not operational	Replace Replace	Two at treatment works are essential Three at reservoirs could be installed later	High Medium
9	Pumping mains	9.1	Existing DN100 uPVC pipes	In use	Repair as necessary	Routine maintenance to prevent sudden bursts as they are essential links without which there will be no supply	High
10	Wundanyi site works	10.1	Drainage	Good	None		NA
		10.2	Fencing & gates	Good	None		NA
		10.3	Staff housing	Good	None		NA
11	Storage	11.1	Storage reservoirs High level (2 x 45m <sup>3</sup> )  Wesu Hospital Reservoir Reservoirs at Wesu (2x60) Reservoirs 1,2,3 & 4	Deteriorating  Good Good Good	Repairs to cracks in walls etc  None None None	Essential for supplying high elevation reticulation	High  NA NA NA
	Booster station	11.2	Booster station No. 3 at Reservoir No. 3 Pumping main from 3 to 4	not operational not operational	Replace pumps & motors Replace pumping main	Essential for supplying high elevation reticulation	High High
12	Distribution	12.1	Existing pipes = and > DN50	In use	Rehabilitate, replace as necessary		High
		12.2	Air valves and valve chamber covers	most are not operational	Replace air valves Provide chamber covers	Essential for consistent supply and lower maintenance	High
		12.3	Consumer meters	Approx. 50% are out of order.	Install domestic meters as necessary	Essential for consistent billing and control of leakage and wastage	High

Corporation; the five River Basin Development Authorities; private sector operators and non governmental organisations;

### **12.2.1 Options for Wundanyi Urban Water Supply**

Applying these guidelines, various institutional and legal options for Wundanyi Urban Water Supply were listed and expounded upon. They were:

- (a) State corporation
- (b) Limited liability company
- (c) Co-operative society
- (d) Trust corporation

After weighing the advantages and disadvantages of each option, and evaluating their conformance with Government of Kenya and JICA requirements, the formation of a Trust Corporation for Wundanyi Urban Water Supply Service was proposed as the best option.

### **12.2.2 Legal requirements and Institutional framework for a Trust Corporation**

The legal requirements for creating the proposed Trust Corporation for Wundanyi Urban Water Supply Service were outlined, together with an institutional framework. The following two structures were recommended:

- (a) A Board of Trustees (BOT)

The Board of Trustees will be the governing body of the Trust Corporation. It will acquire and manage assets on behalf of the stakeholders; and will be responsible for policy guidance and the strategic direction of the Trust Corporation. The proposed Board of Trustees will be appointed from the current stakeholders of Wundanyi Urban Water Supply.

- (b) Management structures

The Trust can operate the water supply and sewerage system in the Town or alternatively, the Trust can contract out this function to a private operator. In the event the BOT decides to manage these services, it can appoint senior members of the Management Team.

These are:

- (a) The General Manager
- (b) The Technical Manager

(c) The Commercial Manager

### 12.2.3 Implementation and Recommended Institutional Form.

The transitional arrangements from the current ownership and operation of the Urban Water Supply to the operations of the proposed Trust Corporation were outlined. The arrangements were:

Developing consensus among important stakeholders on the proposed approach to the operations of Wundanyi Urban Water Supply Service (the Trust Corporation); appointing members of the Trust from identified stakeholders; Preparing the constituting instrument for Wundanyi Urban Water Supply Service; carrying out an inventory of the water supply system infrastructure of Wundanyi Urban Water Supply System and assigning values to these assets; developing organisational structures and staffing plans; completing the financial plan for the new organisation; agreeing on transfer modalities; developing an operations manual for Wundanyi Urban Water Supply Service; and ensuring all the assets, staff and financial resources are in place in the new organisation.

## 12.3 OVERALL FINANCIAL AND ECONOMIC EVALUATION

**Table 12.1 Wundanyi - Overall Financial and Economic Evaluation (Without Sensitivity Analysis)**

Financial Evaluation			Economic Evaluation			Social Concerns		Overall Evaluation
FIRR	NPV	RER	EIRR	NPV	CBR	Health needs	Water needs	
N/V	N/V	N/V	V	V	V	V	V	ESV

N/V = Not Viable

V = Viable

ESV = Socio-economically Investment Justifiable

**Table 12.2 Wundanyi - Overall Financial and Economic Evaluation (With Sensitivity Analysis)**

Financial Evaluation			Economic Evaluation			Social Concerns		Overall Evaluation
FIRR	NPV	RER	EIRR	NPV	CBR	Health needs	Water needs	
N/V	N/V	N/V	N/V	N/V	N/V	V	V	ESV

N/V = Not Viable  
 ESV = Socio-economically Investment Justifiable

### 12.3.1 Financial Evaluation

The project has been assessed not to be financial viable under current tariff regime if a 10-year period is selected. Increase in tariff is not an option here being one of the towns with the highest rate per capita currently. However, the project's ability to cover more than adequately its O&M costs is highly commendable.

It should nevertheless be observed that the 10-year life span given for financial evaluation might be unrealistic for utility investment. A 15-year life span is assumed to be more to the point and over the period, the project is financially viable when financed by Grant.

### 12.3.2 Economic Evaluation

The project is economically viable. From a public goods perspective, it makes good sense to invest in rehabilitating the water and sanitation services. However, it is very sensitive to changes in the investment costs.

### 12.3.3 Social Evaluation

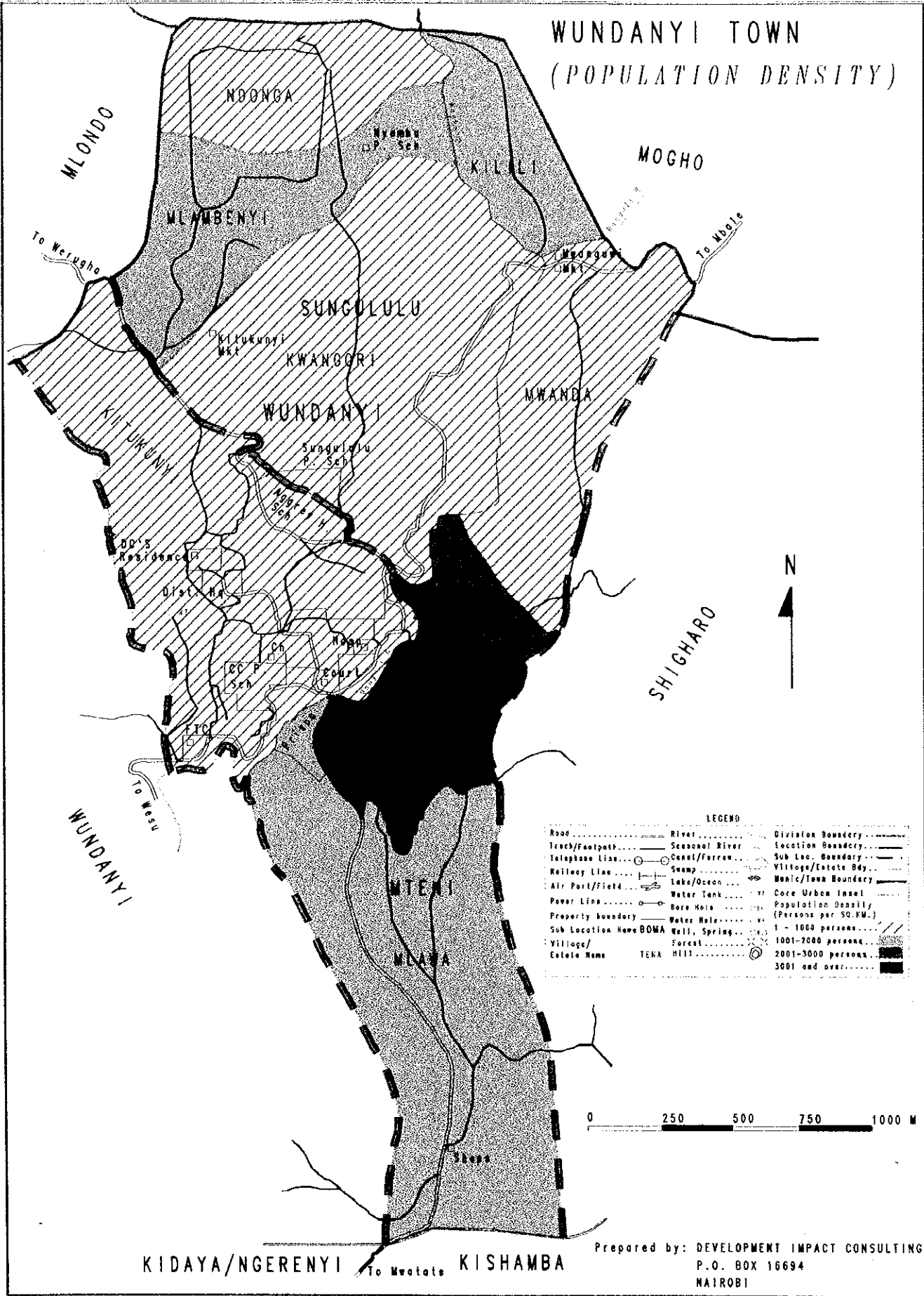
It was found that 95% on average of the residents consider supply of clean water a higher priority than other social infrastructure. They would also be willing to pay a higher tariff to obtain the social benefits arising from a clean and constant water supply system. The project is therefore socially justified.

### 12.3.4 Overall Evaluation

The project, if funded by grant, would be socio-economically justified as provided in Tables 12.1 and 12.2.

# **APPENDIX F1 WUNDANYI TOWN**

# WUNDANYI TOWN (POPULATION DENSITY)



**LEGEND**

Road	River	Division Boundary
Track/Footpath	Seasonal River	Location Boundary
Telephone Line	Canal/Furrow	Sub Loc. Boundary
Railway Line	Swamp	Village/Estate Bdy.
Air Port/Field	Lake/Ocean	Market/Town Boundary
Power Line	Water Tank	Core Urban Inset
Property boundary	Bore Hole	Population Density (Persons per SQ. KM.)
Sub Location Name	Water Hole	1 - 1000 persons
BDMA	Well, Spring	1001 - 2000 persons
Village/Estate Name	Forest	2001 - 3000 persons
TEMA Hill	Hill	3001 and over

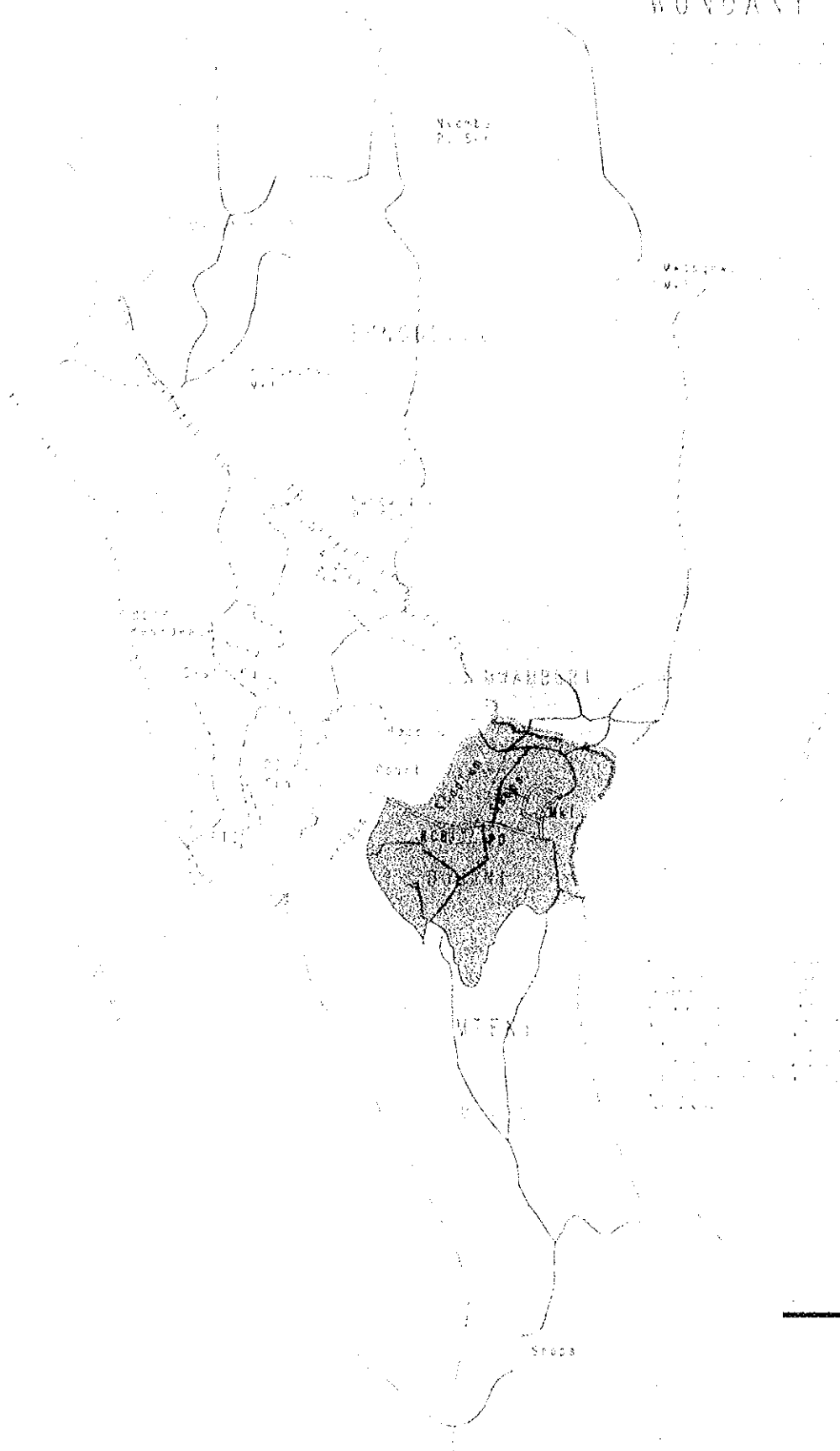
0 250 500 750 1000 M

KIDAYA/NGERENYI To Mvota KISHAMBA

Prepared by: DEVELOPMENT IMPACT CONSULTING  
P.O. BOX 16694  
NAIROBI

# WUNDANY TOWN

1900



WUNDANY TOWN AND SURROUNDING AREAS  
1900

F1-3 1999 POPULATION DATA FOR WUNDANYI TOWN

LOCATION	SUB-LOCATION	AREA	NO. OF HOUSEHOLDS	MALE	FEMALE	TOTAL
WUNDANYI	SUNGULULU	MLAMBENYI	175	384	485	869
		NDONGA	44	100	122	222
		KILILI	71	182	199	381
		MWANDA	86	207	250	457
		KWANGORI	140	359	370	729
		MWAMBURI	109	184	224	408
	MTENI	KITUKUNYI	289	520	538	1058
		BOMANI	456	628	734	1362
		MLAWA (PRISON)	81	100	68	168
		MLAWA Special Population	246	548	554	1,102
			-	-	-	174



**APPENDIX F2**  
**WUNDANYI**  
**TOWN**



WESU WATER TREATMENT WORKS - GENERAL VIEW

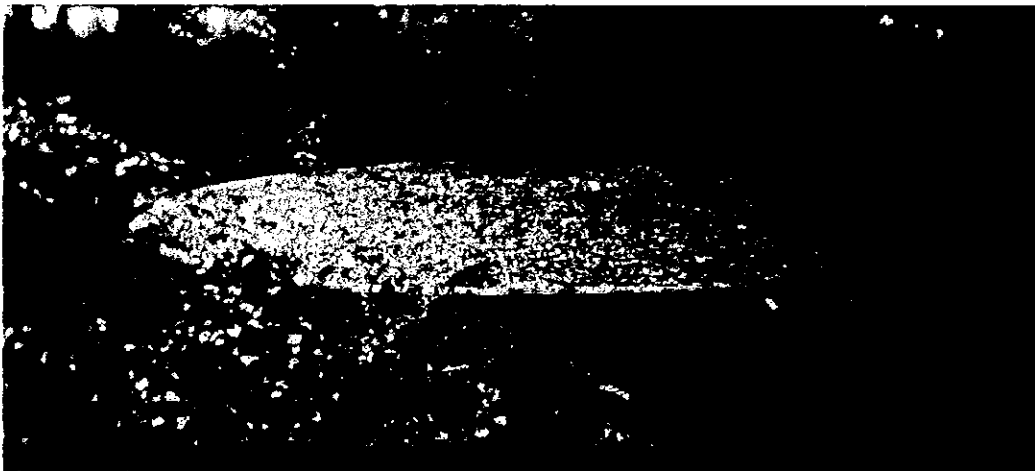


WESU WATER TREATMENT WORKS - INLET WORKS, ALUM DOSING AND COMPOSITE UNIT

**WUNDANYI**



**WUNDANYI RAW WATER INTAKE PUMPING STATION (INTAKE PIPEWORK)**



**WUNDANYI WATER SUPPLY RESERVOIR No. 2 (TOWN CENTRE)  
200m<sup>3</sup> GROUND LEVEL STORAGE TANK**

## APPENDIX A2 - ENGINEERING PRINCIPAL DESIGN CRITERIA

The following principal design criteria are used, with reference to the appropriate sections of the 1986 Design Manual prepared by the Ministry of Water.

### (a) **Water quality**

#### (i) **Bacteriological quality of water**

No faecal coliforms (1986 Design Manual, section 5.2.2, subsection A.1). Following the 1994 WHO guidelines for drinking water quality, this can be achieved by disinfection:

- with a free chlorine residual of 0.5 mg/l (8.12.4 of the 1986 Manual gives 0.3 mg/l to 0.5 mg/l);
- at a pH less than 8, and
- a turbidity less than 1 NTU;
- for at least 30 minutes.

Section 138 of the draft Water Act states:

“All water undertakers must ensure that any water for human consumption shall be disinfected using approved disinfectants and the required residual levels maintained at the reservoirs, distribution lines and end points.”

The word “any” means that all potable water must be disinfected, even groundwater. The word “residual” implies that the approved disinfectants will be limited to chlorine compounds or other halogens. It would not cover UV radiation, ozone, etc.

#### (ii) **Chemical quality of water**

- Fluoride to be less than 1.5 mg/l, or 3 mg/l in exceptional cases (1986 manual, section 5.3.1).
- Colour to be less than 15 TCU (5.3.2) or up to 50 TCU in exceptional cases (5.3.3).
- Turbidity to be less than 1 NTU for disinfection (1994 WHO guidelines).
- pH to be between 6.5 and 8.5 (5.3.2) or up to 9.2 in exceptional cases (5.3.3), but less than 8.0 during disinfection (1994 WHO guidelines).

- Iron to be less than 0.3 mg/l (5.3.2), or 1.0 mg/l in exceptional cases (5.3.3).
- Manganese to be less than 0.1 mg/l (5.3.2), or 0.5 mg/l in exceptional cases (5.3.3).
- Water should not attack concrete or ferrous products (5.3.4). This requirement imposes further limitations on pH.

**(b) Treatment**

**(i) General**

The works should be designed for continuous operation (8.1.4).

**(ii) Pre-settlement**

Section 8.4.1 of the 1986 Design Manual recommends pre-settlement ahead of slow sand filters when raw water turbidity is between 20 and 100 NTU. Pre-settlement tanks may also be used ahead of clarifiers when the turbidity exceeds 1,000 NTU.

**(iii) Aeration**

Not required for surface waters (Section 8.6.1). May be required for groundwater (8.6.2) to be followed by sedimentation or filtration when carried out to oxidise iron and manganese.

**(iv) Treatment chemicals**

Coagulant : aluminium sulphate (8.7.4)  
 pH correction: soda ash (8.7.4)  
 Disinfectant : tropical chloride of lime or calcium hypochlorite (8.12.2)

**(v) Sedimentation**

Section 8.9.3 of the 1986 Design manual requires horizontal flow tanks with a design surface loading of 1 m/hr.

Section 8.9.4 states that the operational requirements of vertical-flow, sludge blanket clarifiers are so strict that they should not be used except under very exceptional circumstances.

**(vi) Rapid gravity filtration**

The principal criteria for rapid gravity filters are:

- design surface loading to be 5 m/hr (8.10.1);

- filter bed thickness 0.7 m to 1.0 m (8.10.2);
- filter media to be quartz sand, 0.5 mm to 1.0 mm, with a uniformity coefficient less than 1.5 (8.10.2);
- backwash rate to be 50 m/hr minimum (8.10.4);
- air scour only in exceptional cases (8.10.4).

**(vii) Chemical dosing for disinfection**

The World Health Organisation recommends that water intended for potable use should be disinfected with 0.5 mg/l of free available chlorine for at least thirty minutes at a pH less than 8. This recognises that germicidal efficiency is dependent on both the free chlorine concentration and the time of contact.

To achieve a free chlorine residual, sufficient chlorine must be dosed to react with any dissolved ammonia, iron, manganese, etc. The required doses are:

- 7.6 g of chlorine to react with 1 g of ammonia;
- 0.54 g of chlorine to react with 1 g of ferrous iron, and
- 1.5 g of chlorine to react with 1 g of manganese.

**(c) Transmission systems**

Transmission systems should be designed for:

- twenty-four hour operation (implied in 12.7.1 for clear water pumps, explicit in 12.7.2 for raw water pumps and 12.7.3 for borehole pumps);
- one standby pump (12.8.1);
- diesel generators to provide 50% cover (12.8.2);
- a minimum head of 4 m in the transmission main (9.3.7).

**(d) Storage**

Section 11.3.1 of the 1986 Design Manual requires balancing storage to be fifty per cent of the daily demand. Section 11.3.2 requires the following emergency storage:

- 12 hours for gravity supply to storage;
- 18 hours for pumped supply;
- 8 hours for supplies from more than one independent system.

**(e) Distribution**

The principal criteria are as follows:

Minimum head at consumer connections to be 10 m;  
Maximum head generally not greater than 60 m.

**(f) Water demand in urban areas**

People with individual connections	high class housing	250lcd
	medium	150
	low	75
People without connections	low	20

# **APPENDIX F3**

# **WUNDANYI**

# **TOWN**



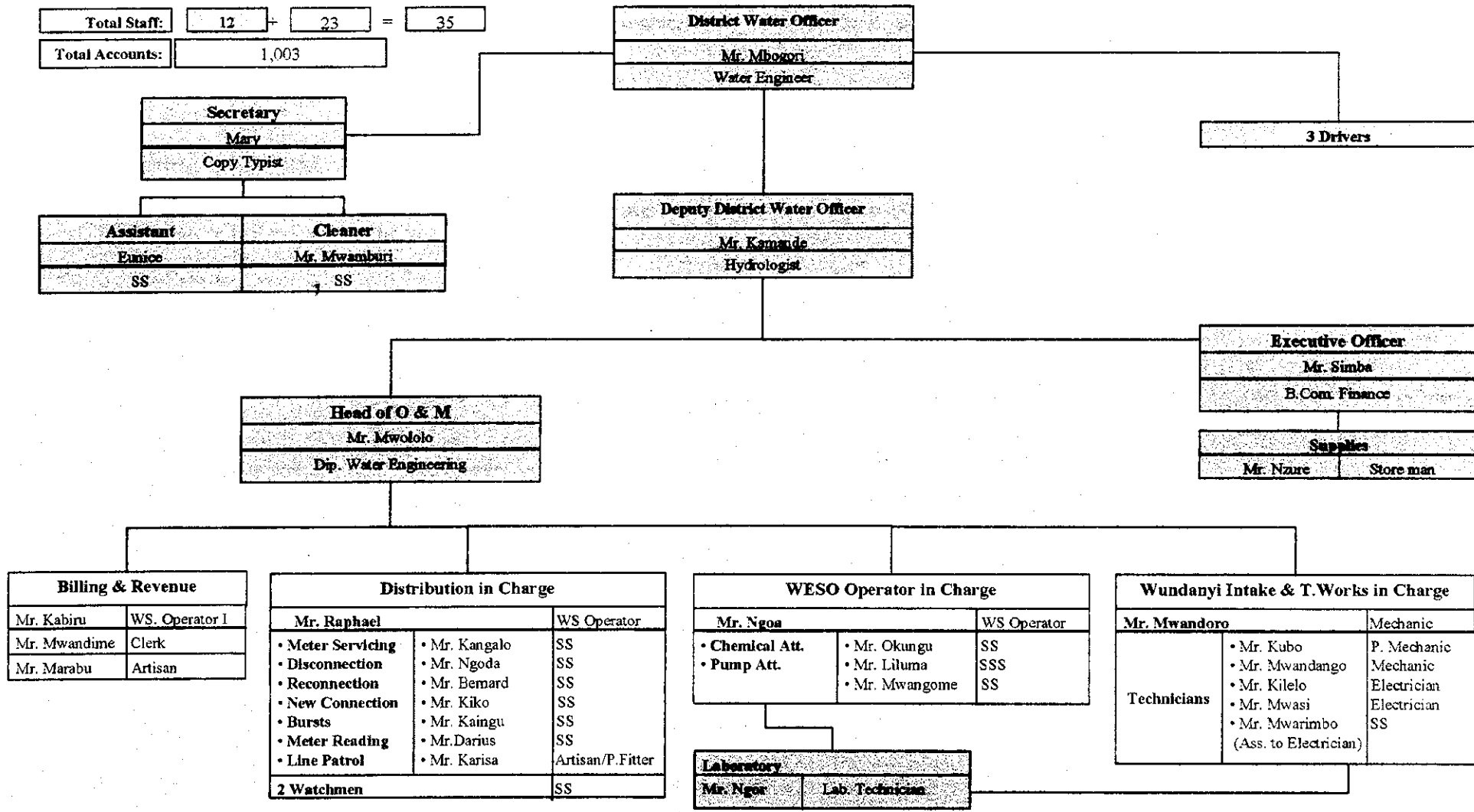


# WUNDANYI WATER SCHEME ORGANISATION CHART

WUNDANYI

STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION OF WATER SUPPLY SYSTEMS  
FOR TEN(10) LOCAL TOWNS IN KENYA

FIGURE: 8.1.6



Staff members shared between district and Wundanyi Water Supply.



Development Impact Consulting



Engineering and Utility Management Ltd.



Gibb Eastern Africa Ltd.

P. O. Box 16694, NAIROBI Tel: 713741, 712649 Fax: 712720 E-mail: dic@insightkenya.com

**CONSORTIUM**

**Study of Institutional Improvement and Rehabilitation of Water Supply Systems for Local Towns in the Republic of Kenya**

**Location:** Wundanyi WS&S System  
**Date:** 25.-26.10.2000

**Interviewer:** LEK and CK

\*\*\*\*\*

**Discussion/Interview with: District Water Officer: Eng. Mbogori**  
**Officer in Charge O&M: Mr. John Mwololo**  
**Executive Officer: Mr. Simba**  
**Revenue Clerk: Mr. Mwandime**

**P.O.Box 1155**  
**Wundanyi**  
**Telephone: 0148-2016 or 2427**

**Lodging difficult, book in advance County Hall Guest House: Tel.: 0148-2096, talk to Flora**

No.	Question:	Answer:
A.	Utility System	
1.	<b>Office Set-up</b> <b>Office space?</b>  <b>Office equipment?</b> <b>Tel.lines?</b> <b>Fax?</b> <b>E-mail?</b> <b>Reliable Power supply?</b> <b>Rationing?</b> <b>Other comments?</b> <b>Hardware, Software and skill:</b> <b>separate questionnaire !!</b>	<i>6 rooms, Ex.Off,Sec,DDWO,DWO,Comp.room, built by Norwegian Project</i> <i>2 Calculators brought in yesterday</i> <i>2</i> <i>No</i> <i>No</i> <i>Yes</i> <i>Not anymore</i>  <i>1 computer for secretary, 1 dot matrix printer</i> <i>2 old computers (one spoilt), however not used for Wundanyi WSS</i>
2.	<b>Staffing Set-up</b> <b>Total number of staff?</b>  <b>Male/Femal ratio?</b> <b>Fluctuation? Due to?</b> <b>Average years within the system?</b>  <b>Orga chart in place?</b> <b>Job description available?</b> <b>Level of skill?</b>  <b>Overdue staff promotion?</b>  <b>Training facilities offered?</b>  <b>Used facilities?</b>  <b>Technical Administration Management</b> <b>Qualification Station Manager</b> <b>Recruitment statistics</b> <b>Remuneration and benefits</b>	<i>35 (6 were retrenched = 17.15%: Power Plant Mechanic, Ass.Exec.Officer, Higher Clerical Officer, Superintendant Mechanical, 2Drivers)</i> <i>For District: 122 staff, retrenched 16 = 13.11%</i>  <i>Not high, more of a reduction exercise</i> <i>7 – 9 years for other staff, but Engineer has changed often, 4<sup>th</sup> since 1993</i> <i>No</i> <i>No,</i> <i>Exec. Officer seems to make a big difference, reflected in A.I.E speed,</i> <i>Yes, especially for Junior staff: forwarded to DC, District Advisory Committee, minutes are sent to HQ for action, but they never act. It can take years</i> <i>Senior staff: despite of annual Appraisal Report Form, nothing happens</i> <i>Not on the administration side, nothing happens, people are frustrated as work is not appreciated, neither do they know why they never get any feed-back</i> <i>Request form filled, but nothing happened in 7 years, only DANIDA has provided for short courses, but all technical</i>  <i>Engineer, studied abroad</i>  <i>HQ</i>
3.	<b>Transport and Logistics</b> <b>Cars? Which? Number:</b> <b>Motorbike? Which? Number:</b>	<i>3, but for the District, no distinction for WSS</i> <i>3, out of DANIDA project, not used for WSS</i>

	<b>Bicycle? Number:</b>	<i>1, but stolen</i>
<b>4.</b>	<b>Institutional Frame MENR: Line of command</b>	<i>Provincial Water Office in Mombasa</i>
<b>B.</b>	<b>Utility Indices</b>	
<b>1.</b>	<b>Billing Consumption Actual vs Estimate  Consumption Billed per month  Consumption Billed for the last 3 years  Billing Efficiency: Water billed/ Water supplied  Billing Effectiveness: How many out of 100 bills are wrong or returned for reason</b>	<i>Refer to Table 8.2.6. Only figure available is for water sold meters and no breakdown on actual vs estimated  Available from Jan – June 2000  Refer to Table 8.2.6. Not calculated as figures uncertain</i>
<b>2.</b>	<b>Revenue &amp; Collection Revenue Billed vs Revenue Collected per month  For the last 3 years monthly and annual figures  Collection efficiency: Total billed/ Total collected</b>	<i>Refer to Table 8.3.6 showing monthly billed, collected and accumulated debt for the financial year 99/00.  Not available</i>
<b>3.</b>	<b>UfW 1 - Recorded consumption/Production (supply efficiency) per month Or production vs billed consumption  For the last 3 years, monthly and annually  Value of UfW: loss x average tariff rate of system per month 2000:  1999:  1998:</b>	<i>Refer to Table 8.2.6 but figures representing UfW highly doubtful  Not available  No meaningful average tariff can be calculated using figures from Table 8.2.6  Not available  Not available  Not available</i>
<b>4.</b>	<b>Tariff What is the average tariff rate per cbm? Total billed water/Total water supplied Tariff structure? Current</b>	<i>Cannot be established with the figures provided.  Refer to Table 8.2.6  Refer to Gazetted Tariff</i>

	<b>Last 3 years: Additional charges? Additional sources of income?</b>	<i>None</i>
5.	<b>Funding Required Funding per month? Salary Procurements Power Chemicals Others</b>	<i>Done through provision of AIE which is 65% of revenue collected HO Financed with AIE received HO HO ?</i>
6.	<b>Cost Total per month Salary Power O&amp;M Administration Others</b>	<i>Refer to Table 8.5.6 HO HO 2,178,100.10 through AIE ? ?</i>
7.		
8.	<b>Debt Arrears Debt Arrears Situation in Kshs Increase per month Total FY 99/00 Debtors Totals/Billed Revenue Debtors Totals/Collected Revenue</b>	<i>Reflected in Table 8.3.6. which contains monthly billed, collections and accumulated debt for the FY 99/00. Accumulated revenue as at June 00 is shown as Kshs. 3,873,912.00 Not calculated as provided figures doubtful</i>
C.	<b>Utility Procedures</b>	
1.	<b>Staff Recruitment</b>	<i>According to the DWO it is a question of will and management to get what you have asked for.</i>
2.	<b>Defaulters Handling</b>	<i>Domestic Consumers: just disconnect Institutions are informed about intention to disconnect. If illegal re-connection and found and reported, DWO deals with it</i>
3.	<b>Administration Are debtors maintained monthly? Is an aging analysis available?  Debtors lists for different Consumer categories?</b>	<i>No No  No</i>
	<b>Accounting Manual or computerised? If manual elaborate: Double Book keeping done Ledger cards</b>	<i>Manual, but there is no accounting</i>
4.	<b>Funding</b>	<i>DWO requests for an AIE from MENR HQ based on 65% of monthly revenue collection. The AIE is processed through MENR and Treasury, and finally sent to the DWO.</i>
5.	<b>Installment Payment</b>	<i>Yes, possible, but no procedure determined</i>
6.	<b>Meter Reading &amp; Billing</b>	<i>There are MR books and consumer ledgers MR (4 people) starts from 25<sup>th</sup> of every month and all 1096 accounts are visited There are zones:</i>

		<p style="text-align: center;">Township GOK Quarters Kitukunyi Mulawa Teso</p> <p><i>They go with MR books or plain paper Enter either straight or back in the office into the MR books Provide Billing&amp;Revenue section with the books, who transfer into the consumer ledgers (5 nos) Payment information received every day and entered into the consumer ledger Billing held until all meters are read. Bills to be received within a month from reading They can skip a bill or two if there is no stationery or finance for mailing, bills are not delivered, because they had tried and the consumers did not like it, they complained. District Departments get by delivery book or collected from billing office. Approx. 400 are posted. Very few consumers complain, mainly on getting a bill when no water has been flowing.</i></p>
	<b>New Connection</b>	<p><i>No registry on new connections available, information can only be abstracted by going through the application forms. Principle for giving new numbers: Area/Zone/Number (leaving gaps of 250 from the last)</i></p>
7.	<b>Disconnection</b>	<p><i>O&amp;M extracts information from consumer ledger, prepare list and get go-ahead from DWO. Done on a zonal basis, but: They go 1P/Pf and 2 SS, all on foot, therefore very few disconnections can be carried out.</i></p>
8.	<b>Meter Servicing</b>	<p><i>Only flushing, other problems cannot be attended to. but not known how many per month are dealt with, different makes and no spares. DWO had meeting at HQ with Se.Fin.Officer, Dep.Director O&amp;M, -Conservation and -Development and agreed that HQ will purchase for Major consumers to replace those not functioning and master meters. Lacking advise as to how to deal with the issue of consumer provides for meter</i></p>
9.	<b>HQ Reporting</b>	<p><i>DWO meets PWO every 3 months, but depending on the issue he as well goes directly to HQ Ex.Officer prepares all reporting for HQ. In all the years no reply to questions raised, only in connection with personnell issues the HQ reacts promptly. Normally no payroll or salary payment problems.</i></p>
10.	<b>Procedure Manuals</b>	<i>Not available</i>

11.	<b>Financial Control</b>	<i>No financial control. Consumer payments are done at the DC's office and expenditure is based on the AIE allocated.</i>
	<b>Consumer Deposits</b>	<i>Initial Deposit: paid with separate receipt which is to be produced when closing the account, but difficult, because deposit which was initially kept by the District, has been called back by the OP. When claiming the deposit, Revenue Clerk issues voucher, but not sure whether the consumer then gets the deposit back. Balance in May 99 was 91,310.00 Kshs, but between May 99 and October 00 balance in the Rev.Clerk's ledger was 45,800.00 Since 2/2000 they are charging Kshs 1,000.00 Deposit handling for consumers that have been disconnected severally and deposit have been increased in the meantime. No clear instruction from HQ</i>
	<b>Cash/Cheque Un-accounted for cash advances?</b>	<i>No</i>
	<b>Consumer payments into consumer accounts?</b>	<i>The consumer ledgers are updated with payments made by getting payment details from the DC's office</i>
	<b>Cash/Bank book maintained and up to date?</b>	<i>N/A</i>
13.	<b>Reconciliation For Cash? For Bank?</b>	<i>N/A</i>
<b>D.</b>	<b>Discussions</b>	
1.	<b>Staff Awareness of operation and financing cost vs turnover?</b>	<i>No</i>
	<b>Job satisfaction and expectation?</b>	<i>Retrenchment exercise has affected people. Information requested from WSS was which staff is in place, but choice done from HQ and no consideration given to the effects of it to the WSS.</i>
	<b>Existing constraints?</b>	<i>Yes</i>
	<b>Physical</b>	<i>No transport</i>
	<b>Financial</b>	<i>AIE is never enough, Office extension at T-Works for officer in charge, protective clothing for chem. Attendants, tools</i>
	<b>Institutional</b>	<i>Deployment should be in line with your training. Suggestion: Bring HQ closer, i.e. why are personnell issues not dealt with at provincial or district level? Imprest issue: Staff use their own money: Photocopy for retrenched staff cannot wait, i.e. officer uses his own money to do what has to be done</i>
	<b>Political</b>	
	<b>Personnel</b>	<i>More staff required, MR, Billing officers, P/Pf</i>

	<p><b>Efforts made to overcome the constraints?</b></p> <p><b>Consumer relationship?</b></p> <p><b>Relationship with PWE?</b></p> <p><b>Relationship with Ministry?</b></p> <p><b>Relationship with LA? Planning Department?</b></p> <p><b>With other utility providers?</b></p> <p><b>External influence affecting the performance?</b></p> <p><b>Working environment?</b></p> <p><b>What is the opinion about PSP?</b></p>	<p><i>Good</i></p> <p><i>Only through DWO</i></p> <p><i>Monthly to Nairobi, when payroll is collected, Personnell issues: Officers in HQ are allocated the staff nos they have to deal with, i.e. if you deal with Wundanyi staff at HQ, you might have to deal with 10 different officers</i></p> <p><i>Since 6 months error in Wundanyi station code for a staff member but despite of writing to salary section, no change effected</i></p> <p><i>No problem with salaries otherwise</i></p> <p><i>No</i></p> <p><i>No, development in town centre has not seen any major new building for years</i></p> <p><i>No</i></p> <p><i>No</i></p> <p><i>Good</i></p> <p><i>Service would be improved, if a commercial approach were chosen. Fear to loose their job there due to the retrenchment exercise</i></p> <p><i>General attitude towards PSP positive</i></p>
2.	<p><b>Consumers</b></p> <p><b>Comments on:</b></p> <p><b>Reliability</b></p> <p><b>Quality</b></p> <p><b>Billing</b></p> <p><b>Price</b></p> <p><b>Consumer requests on:</b></p> <p><b>Coverage</b></p> <p><b>Reaction Time</b></p> <p><b>Proposed changes</b></p> <p><b>Service rating</b></p> <p><b>Cost in relation to service provided?</b></p> <p><b>Tapped vs kiosk?</b></p> <p><b>View and understanding of PSP?</b></p> <p><b>What does the consumer expect?</b></p> <p><b>What does the consumer propose?</b></p> <p><b>What is his/her situation on rationing?</b></p>	<p><i>No discussions held</i></p>
3.	<p><b>Stakeholders</b></p>	<p><i>No discussions held</i></p>



<b>E.</b>	<b>Consumers</b>	
1.	<b>Consumer Portfolio</b> <b>Total number?</b> <b>Ratio Major/minor consumers?</b>  <b>Consumer classification</b> <b>Consumer categories?</b>  <b>No. of new connect. Applied?</b> <b>No of new connect. Done?</b>  <b>Percentage of suspected illegal connections?</b> <b>Coverage water?</b>  <b>How many Kiosks are in operation?</b>  <b>Coverage Sanitation?</b>	<i>1004 nos, active:?</i> <i>Not known</i> <i>Not used</i> <i>GOK and others</i>  <i>??</i> <i>New or transfer:</i> <i>1999: 49</i> <i>upto 10/00: 44 information from Deposit ledger</i> <i>few</i>  <i>DWO thinks 80 %</i>  <i>Nil, kiosks were constructed by the Ministry, but nobody applied for the running of the same.</i>  <i>N/A, there is no sanitation</i>
2.	<b>Consumer Indices</b>	
3.	<b>Consumer Procedures</b> <b>Open account?</b>  <b>Close account?</b>  <b>Get a credit into the next bill?</b>  <b>Change address?</b>  <b>Transfer account?</b>	<i>Consumer requests for an account. Site visit done by operator in charge + pipefitter to confirm availability of water. Consumer informed what to pay connection fee of Kshs. 100 + deposit and bring fittings + meter. After payment an application for is filled, an account opened in the ledger and consumer connected.</i>  <i>?</i>  <i>Consumer writes a letter, approved by DWO and Head of O &amp; M and then consumer ledger is changed</i>  <i>Current user has to fill in a termination agreement form. Final account is prepared and should be cleared. Consumer taking over has to fill Supply Agreement form and is given a new account number. Connection numbers remain the same</i>
<b>F.</b>	<b>Technical System</b>	
1.	<b>System Components?</b>  <b>Is pumping necessary?</b>	<i>Intake Weso and Wundanyi, T-Works</i>  <i>Yes</i>
2.	<b>Zonal Meters</b> <b>How many are in the system?</b> <b>Are they controlling areas?</b> <b>Are they functioning?</b>	<i>3</i> <i>No production</i> <i>No</i>
3.	<b>Network</b> <b>Transmission lines?</b> <b>Distribution lines?</b>	<i>?</i> <i>?</i>

	<b>Consumer lines? Whole system coverage? Fully utilised?</b>	?
4.	<b>Coverage</b>	<i>Not clear, but think approx. 80%</i>
<b>G.</b>	<b>Technical Indices</b>	
1.	<b>Production Capacity per day  Actual per day  Production Efficiency?</b>	<i>Wundanyi Intake: Rating of the 2 pumps: 7.5 hpower Produce approx.: 32 cbm/hour x 12 hours pumping = 384 cbm Weso: design 31 cbm/hour, but due to drought it is estimated to be less than half, i.e. 14 cbm/h x 24 hours pumping = 336 cbm Total daily production: 720 cbm 2 Master meters, but broken down before 1993</i>
2.	<b>Pumping Efficiency</b>	<i>Not available as actual prod.per hour estimated.</i>
3.	<b>Supply Efficiency Recorded consumption/actual production</b>	<i>Refer to Table 8.3.6</i>
4.	<b>Service Efficiency How many days to attend to the problem?  No. of total meters/number of operational meters?  Total zonal meters/operational zonal meters?</b>	?  ?  ?
5.	<b>Sanitation Treatment Capacity Actual</b>	<i>No sanitation</i>
<b>H.</b>	<b>Technical Procedures</b>	
1.	<b>O&amp;M</b>	<i>No schedule or system in place</i>
2.	<b>Rationing</b>	<i>Not any more</i>
3.	<b>Stock&amp;Procurement Itemised stock list? Stock value Repair workshop Meter test bench Meter repairs/month/year Meter calibration Meter test request by consumers? List of tools and repair equipment available?</b>	<i>Not available Not available No No N/A No ? No</i>
4.	<b>Meter Test Procedures</b>	<i>Not done</i>
5.	<b>Requisition Procedures</b>	<i>Request for Master meters placed long time ago, but no allocation, i.e. no funds provided. In the past, meters were sent to Provincial office Mombasa initially, but now repair facility not</i>

		<p><i>functioning anymore since approx. 1993. For other requirements, user depart. makes a requisition. If items in store they are issued. If not available an LPO is raised.</i></p>
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**STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION  
OF WATER SUPPLY SYSTEMS FOR TEN (10) LOCAL TOWNS IN KENYA**

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No. Of Consumers	ARREARS (Kshs.)	JUNE 2000 BILL (Kshs.)	CONSUMER NEVER CONNECTED	METERED	FLAT RATE	WORKING	NON-WORKING	NO WATER	CUT OFF	ACTUAL CONSUMPTION (JUNE 2000) M3	AVERAGE CONSUMPTION M3	LAST PAYMENT (Kshs.)
1,140	3,289,084.15	423,967.00	4	1,114	-	493	290	359	357	5,710	4,310	1,412,820.02
No. Of Actual Bills			Total Of Active & Inactive			Total m3 Billed						
428			783			10,020						
No. Of Estimate Bills												
194												
Assumed In-Active												
514												
<b>Total</b>												
1,140												
Consumers Never Connected												
4												
Minimum Charge Bills												
67.04%												

NOTE: While last payment column was supposed to reflect payments prior to 30th June 2000, payments are reflected upto 10<sup>th</sup> November 2000

**STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION  
OF WATER SUPPLY SYSTEMS FOR TEN (10) LOCAL TOWNS IN KENYA**

A/C No.	CONNECTION No.	ARREARS (Kshs.)	JUNE 2000 BILL (Kshs.)	CONSUMER NEVER CONN-ECTED	METERED	FLAT RATE	WORKING	NON-WORKING	NO WATER	CUT OFF	CUT OFF DATE	ACTUAL CONSUMPTION (JUNE 2000) M3	AVERAGE CONSUMPTION M3	LAST PAYMENT (Kshs.)	DATE OF LAST PAYMENT
001-00018	1		710.00		1		1					27		680.00	18/10/00
001-00507	2	500.00	250.00		1		1					5		250.00	6/10/00
001-01500	220	500.00	500.00		1		1					29		770.00	22/8/00
001-02017	3	5,106.00	560.00		1		1					22		268.00	28/10/99
001-02507	4	1,125.00	250.00		1			1					10	500.00	20/7/00
001-03013	5	2,256.00			1			1	1	1	13/3/00			2,000.00	14/12/99
001-03500	6	1,625.00	250.00		1		1					6		1,625.00	10/7/00
001-04000	7	500.00			1			1	1	1	7/12/99			250.00	21/9/00
001-04501	8	2,125.00	250.00		1		1		1			1		500.00	5/10/00
001-05015	9	7,314.00	890.00		1		1			1	7/9/00	33		500.00	11/8/00
001-05507	10	250.00	250.00		1			1						500.00	18/9/00
001-06015	11	250.00	250.00		1		1					1			
001-06511	12	500.00	250.00		1		1					3		500.00	23/10/00
001-07014	13	950.00	250.00		1		1					4		1,000.00	18/5/00
001-07508	14	700.00	250.00		1			1						200.00	10/8/00
001-08006	15	1,461.00	350.00		1			1					12	200.00	18/8/00
001-08509	16	11,861.00	1,190.00		1		1					43		1,000.00	17/4/00
001-09010	17	955.00	400.00		1		1					16		700.00	5/9/00
001-09513	18	1,166.00	620.00		1		1					24		916.00	4/8/00
001-10013	19	807.00	250.00		1		1					9		1,000.00	28/8/00
001-10510	20	2,115.00			1			1	1	1	13/3/00			2,000.00	8/11/99
001-11000	21	220,011.00	18,650.00		1			1					300	100,000.00	23/6/00
001-11500	22	157,397.00	12,875.00		1			1					223	80,000.00	23/6/00
001-12000	23	190,580.00	10,850.00		1			1					196	100,000.00	6/7/00
001-12501	24	1,424.00	680.00		1		1					26		222.00	20/9/00
001-13001	25	3,877.00	620.00		1		1					24		3,877.00	10/7/00
001-13504	26	1,315.00			1				1	1	7/3/97			1,035.00	8/7/96
001-14010	27	19,682.00	475.00		1		1					19			
001-14503	28	1,548.00	250.00		1		1					7		800.00	4/4/00
001-15000	29	2,286.00			1				1	1	2/6/98			3,000.00	7/8/98
001-15500	30	84,787.00			1				1	1	31/7/92			869.50	15/10/91
001-16000	31	28,942.00			1				1	1	26/8/99			4,050.00	8/7/96
001-16508	32	880.00	250.00		1		1					7		980.00	25/8/00
001-17000	33	1,427.00	1,100.00		1		1					40		250.00	17/10/00
001-17508	34	775.00	425.00		1		1					17		3,586.00	9/5/00
001-18001	35	1,050.00	250.00		1		1					7		600.00	18/9/00
001-18500	36	525.00	375.00		1		1					15		1,005.00	19/10/00
001-19011	37	500.00	250.00		1			1					10	250.00	14/8/00
001-19500	38	4,458.00	1,190.00		1		1					43		2,000.00	19/10/00
001-20003	39	1,745.00	1,625.00		1		1					55		425.00	30/8/00
001-20500	40	6,277.00			1		1		1	1	4/5/00			1,500.00	28/6/99
001-21000	41	1,800.00	250.00		1			1					10	1,000.00	9/10/00
<b>SUB-TOTAL</b>		<b>773,352.00</b>	<b>57,835.00</b>	<b>0</b>	<b>42</b>	<b>0</b>	<b>26</b>	<b>12</b>	<b>9</b>	<b>9</b>		<b>483</b>	<b>761</b>	<b>320,808.50</b>	



**STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION  
OF WATER SUPPLY SYSTEMS FOR TEN (10) LOCAL TOWNS IN KENYA**

Year 2000	January	February	March	April	May	June
No. of connections metered	1094	1096	1096	1096	1096	1096
No. of connections flat rate	-	-	-	-	-	-
Total Prod. M <sup>3</sup>	20,206	20,026	19,674	20,826	19,699	20,826
Water Sold M <sup>3</sup> (metered)	19,320	18,632	18,236	19,236	18,236	19,236
Flat rate M <sup>3</sup>	-	-	-	-	-	-
Kiosk m <sup>3</sup>	-	-	-	-	-	-
Unaccounted for W.	886	1,394	1,438	1,590	1,463	1,590
Alum consumed (kg)	1,829	1,829	1,736	1,829	1,736	1,829
Soda Ash consumed	1,457	1,457	1,383	1,457	1,383	1,457
Chlorine consumed	65	65	62	65	61.80	65.10
No. of Disconnections	1	3	28	3	23	5
No. of Reconnections	2	4	5	3	14	5
KWH Consumed	7,832	7,428	7,618	7,540	6,269	6,284
<b>Revenue</b>						
New connections	-	-	-	-	-	-
Reconnections	1,000.00	2,000.00	2,500.00	1,500.00	7,000.00	2,500.00
Metered	388,244.00	396,870.00	372,950.00	409,475.00	373,465.00	383,172.00
Flat	-	-	-	-	-	-
Kiosks	-	-	-	-	-	-
<b>Total Revenue</b>	<b>389,244.00</b>	<b>398,870.00</b>	<b>375,450.00</b>	<b>410,975.00</b>	<b>380,465.00</b>	<b>385,672.00</b>
<b>Expenditure</b>						
Fuel	34,069.00	32,311.00	33,138.00	32,799.00	27,271.00	27,336.00
Chemicals	60,454.00	60,454.00	57,301.00	60,454.00	57,381.00	60,454.00
Maintenance	1,040.00	2,200.00	2,280.00	1,950.00	2,016.00	700.00
Transport + Utilities	500.00	800.00	800.00	1,050.00	3,000.00	3,750.00
Replacement of Equip						
Tel. Stationery, Transport						
Allowances						
<b>Total Expenditure</b>	<b>96,063.00</b>	<b>95,765.00</b>	<b>93,519.00</b>	<b>96,253.00</b>	<b>89,668.00</b>	<b>92,240.00</b>

**STUDY OF INSTITUTION IMPROVEMENT AND REHABILITATION OF WATER SUPPLY SYSTEMS  
FOR TEN (10) LOCAL TOWNS IN KENYA**

**YEAR 2000**

	<b>JUNE</b>	<b>MAY</b>	<b>APRIL</b>	<b>MARCH</b>	<b>FEBRUARY</b>	<b>JANUARY</b>
Accumulated Debt	3,716,960.00	3,539,148.00	3,343,875.00	3,201,310.00	3,038,944.00	2,732,992.00
Current month billed revenue	385,672.00	380,465.00	410,975.00	375,450.00	398,870.00	389,244.00
Total revenue collectable	4,102,632.00	3,919,613.00	3,754,850.00	3,576,760.00	3,437,814.00	3,122,236.00
Accumulated FY collection	2,172,738.00	1,944,018.00	1,741,365.00	1,525,663.00	1,292,778.00	1,056,274.00
Total outstanding revenue	3,873,912.00	3,716,960.00	3,539,148.00	3,343,875.00	3,201,310.00	3,038,944.00

**YEAR 1999**

	<b>DECEMBER</b>	<b>NOVEMBER</b>	<b>OCTOBER</b>	<b>SEPTEMBER</b>	<b>AUGUST</b>	<b>JULY</b>
Accumulated Debt	2,631,995.00	2,643,405.00	2,886,262.00	2,748,350.00	2,622,925.00	2,570,010.00
Current month billed revenue	190,640.00	196,844.00	192,270.00	185,585.00	187,675.00	183,750.00
Total revenue collectable	2,822,635.00	2,840,249.00	3,078,532.00	2,933,935.00	2,810,600.00	2,753,760.00
Accumulated FY collection	972,982.00	883,339.00	675,085.00	239,958.00	192,285.00	130,835.00
Total outstanding revenue	2,732,992.00	2,631,995.00	2,643,405.00	2,886,262.00	2,748,350.00	2,622,925.00



**STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION  
OF WATER SUPPLY SYSTEMS FOR TEN (10) LOCAL TOWNS IN KENYA**

Year 2000	January	February	March	April	May	June
No. of connections metered	1094	1096	1096	1096	1096	1096
No. of connections flat rate	-	-	-	-	-	-
Total Prod. M <sup>3</sup>	20,206	20,026	19,674	20,826	19,699	20,826
Water Sold M <sup>3</sup> (metered)	19,320	18,632	18,236	19,236	18,236	19,236
Flat rate M <sup>3</sup>	-	-	-	-	-	-
Kiosk m <sup>3</sup>	-	-	-	-	-	-
Unaccounted for W.	886	1,394	1,438	1,590	1,463	1,590
Alum consumed (kg)	1,829	1,829	1,736	1,829	1,736	1,829
Soda Ash consumed	1,457	1,457	1,383	1,457	1,383	1,457
Chlorine consumed	65	65	62	65	61.80	65.10
No. of Disconnections	1	3	28	3	23	5
No. of Reconnections	2	4	5	3	14	5
KWH Consumed	7,832	7,428	7,618	7,540	6,269	6,284
<b>Revenue</b>						
New connections	-	-	-	-	-	-
Reconnections	1,000.00	2,000.00	2,500.00	1,500.00	7,000.00	2,500.00
Metered	388,244.00	396,870.00	372,950.00	409,475.00	373,465.00	383,172.00
Flat	-	-	-	-	-	-
Kiosks	-	-	-	-	-	-
<b>Total Revenue</b>	<b>389,244.00</b>	<b>398,870.00</b>	<b>375,450.00</b>	<b>410,975.00</b>	<b>380,465.00</b>	<b>385,672.00</b>
<b>Expenditure</b>						
Fuel	34,069.00	32,311.00	33,138.00	32,799.00	27,271.00	27,336.00
Chemicals	60,454.00	60,454.00	57,301.00	60,454.00	57,381.00	60,454.00
Maintenance	1,040.00	2,200.00	2,280.00	1,950.00	2,016.00	700.00
Transport + Utilities	500.00	800.00	800.00	1,050.00	3,000.00	3,750.00
Replacement of Equip						
Tel Stationery, Transport						
Allowances						
<b>Total Expenditure</b>	<b>96,063.00</b>	<b>95,765.00</b>	<b>93,519.00</b>	<b>96,253.00</b>	<b>89,668.00</b>	<b>92,240.00</b>

**STUDY OF INSTITUTION IMPROVEMENT AND REHABILITATION OF WATER SUPPLY SYSTEMS  
FOR TEN (10) LOCAL TOWNS IN KENYA**

**YEAR 2000**

	JUNE	MAY	APRIL	MARCH	FEBRUARY	JANUARY
Accumulated Debt	3,716,960.00	3,539,148.00	3,343,875.00	3,201,310.00	3,038,944.00	2,732,992.00
Current month billed revenue	385,672.00	380,465.00	410,975.00	375,450.00	398,870.00	389,244.00
Total revenue collectable	4,102,632.00	3,919,613.00	3,754,850.00	3,576,760.00	3,437,814.00	3,122,236.00
Actual collection	228,720.00	202,653.00	215,902.00	232,885.00	236,504.00	83,292.00
Accumulated FY collection	2,172,738.00	1,944,018.00	1,741,365.00	1,525,663.00	1,292,778.00	1,056,274.00
Total outstanding revenue	3,873,912.00	3,716,960.00	3,539,148.00	3,343,875.00	3,201,310.00	3,038,944.00

**YEAR 1999**

	DECEMBER	NOVEMBER	OCTOBER	SEPTEMBER	AUGUST	JULY
Accumulated Debt	2,631,995.00	2,643,405.00	2,886,262.00	2,748,350.00	2,622,925.00	2,570,010.00
Current month billed revenue	190,640.00	196,844.00	192,270.00	185,585.00	187,675.00	183,750.00
Total revenue collectable	2,822,635.00	2,840,249.00	3,078,532.00	2,933,935.00	2,810,600.00	2,753,760.00
Actual collection	89,643.00	208,254.00	435,127.00	47,673.00	62,250.00	130,835.00
Accumulated FY collection	972,982.00	883,339.00	675,085.00	239,958.00	192,285.00	130,835.00
Total outstanding revenue	2,732,992.00	2,631,995.00	2,643,405.00	2,886,262.00	2,748,350.00	2,622,925.00

**STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION  
OF WATER SUPPLY SYSTEMS FOR TEN (10) LOCAL TOWNS IN KENYA**

## 1. G.O.K. Accounts as Provided

CONSUMER NAME	ACCOUNT NUMBER	OUTSTANDING AS AT JUNE 2000	CONSUMER NAME	ACCOUNT NUMBER	OUTSTANDING AS AT JUNE 2000
DC's Office	001-03500	1,625.00	District Public Health	001-88500	2,000.00
Administration Police	001-16000	28,942.00	Sagalla Health Center	001-13500	Not stated
DO's Office Wundanyi	004-25251	Not stated	Sagalla Health Center	001-90000	500.00
Administration Police	004-82750	2,035.00	District Public Health	004-20252	2,875.00
Chief's Office Wundanyi	001-13504	1,315.00	District Lands Office	001-45501	2,530.00
DC's Labour Camp	001-15500	84,787.00	District Surveyor	001-30000	720.00
Chief's Office Embwa	001-04900	Not stated	District Surveyor	001-61000	13,936.00
Administration Police	001-13001	3,877.00	District Information Off.	002-12001	33,415.00
Administration Police	001-21501	1,625.00	District Coop. Office	003-64501	2,125.00
Wundanyi Police Station	001-12000	190,580.00	District Forest Officer	003-39000	1,200.00
Registration Office	004-46500	4,095.00	District Works Officer	001-96000	4,255.00
District Agric. Officer	001-04501	2,125.00	District Works Officer	002-29501	16,214.00
District Agric. Officer	001-32001	6,309.00	<b>Sub - Total:</b>		<b>1,515,838.00</b>
FTC Ngerenyi	001-70500	68,875.00			
District Agric. Officer	002-74500	Not stated			
Distriact L. Prod. Officer	001-91002	1,375.00			
District Vet. Officer	002-43501	2,000.00			
Wundanyi GK Prison	001-11000	220,011.00			
Wundanyi GK Prison	001-11500	157,397.00			
Prison Warder's Line	001-24250	8,650.00			
District Social Dev. Off.	001-91501	1,310.00			
District Adult Ed. Officer	004-04000	1,005.00			
Wesu Hospital	001-25500	643,675.00			
Wundanyi Health Centre	001-42500	4,455.00			

## 2. OTHER (With consumption &gt; 100m3 per month or arrears &gt;Kshs.20,000.00)

Extracted from base data absorbed from consumer ledgers in Wundanyi for June 2000.

ACCOUNT NUMBER	CONNECTION NUMBER	OUTSTANDING AS AT JUNE 2000
001-84500	170	5,716.00
002-13000	226	49,721.00
005-26750	1116	11,530.00
<b>Sub - Total:</b>		<b>66,967.00</b>

Total outstanding minor consumers	1,706,279.15
Total outstanding major consumers	1,582,805.00
Total outstanding as at June 2000	<b>3,289,084.15</b>
Number of billable connections	783
Number of minor consumer connections	744
Number of major consumer connections	39
Average outstanding / minor consumer	2,293.39
Average outstanding / major consumer	40,584.74

**STUDY OF INSTITUTIONAL IMPROVEMENT AND REHABILITATION OF WATER SUPPLY SYSTEMS  
FOR TEN (10) LOCAL TOWNS IN KENYA**

MONTH	REVENUE COLLECTED FY 99/00	A.I.E. APPLIED FOR	RECEIVED ALL./LIQUIDITY	EXPENDITURE INCURRED FY 99/00		
				ITEM	ALLOCATED	ACTUAL
July	130,835.00	438,600.00	235,000.00	Passage & Leave Exp.(887)	120,000.00	119,899.25
August	62,250.00		(project)130,000.00	Travelling & Accom. Exp(892)	132,300.00	131,524.00
Sept.	47,673.00	400,000.00	333,000.00	Purchase of Meter(894)	15,000.00	14,999.00
Oct	435,127.00		(project)225,000.00	Purchase of Stationery(887)	65,000.00	65,000.00
Nov	208,254.00		400,000.00	Postal & Telegrams(892)	65,000.00	64,982.00
Dec	89,643.00	262,300.00	262,300.00	Postal & Telegrams(887)	30,000.00	29,978.00
Jan	83,292.00	250,000.00		Purchase of Uniforms(887)	25,000.00	25,000.00
Feb	236,504.00			110,000.00	Honararium(890)	8,000.00
March	232,885.00	272,000.00	640,000.00	Transport(887)	100,000.00	99,999.10
April	215,902.00		200,000.00	Travelling(887)	30,000.00	29,990.00
May	202,653.00			Purchase of Uniforms(892)	10,000.00	10,000.00
June	228,720.00			Stationery(892)	20,000.00	20,000.00
<b>Total</b>	<b>2,173,738.00</b>	<b>1,622,900.00</b>	<b>2,180,300.00</b>	Maintenance of Water Supplies(892)	340,000.00	339,927.50
			<b>(project)355,000.00</b>	Telephone(892)	60,000.00	59,200.00
				Telephone(887)	30,000.00	30,000.00
				Transport Operating Exp.(892)	310,000.00	309,948.10
				Purchase of meters(887)	20,000.00	20,000.00
				Uniform(887)	20,000.00	20,000.00
				Maintenance of Water Supplies(887)	280,000.00	279,899.15
				Purchase of supplies for prod(886)	500,000.00	499,754.00
				<b>Total</b>	<b>2,180,300.00</b>	<b>2,178,100.10</b>
				<b>Balance</b>		<b>2,199.90</b>
				<b>Development</b>		
				Rehabilitation of w/s(524)	125,000.00	124,921.00
				Construction of w/s(524)	100,000.00	99,908.00
					<b>225,000.00</b>	<b>224,829.00</b>
				<b>Development(Community w/s)</b>		
				Maintenance of w/s(Mwakilau)	100,000.00	99,948.00
				Community Management of w/s(886)	30,000.00	29,968.20
					<b>130,000.00</b>	<b>129,916.20</b>

Percentage allocated to Wundanyi as A.I.E. is 65%

STUDY OF INSTITUTION IMPROVEMENT AND REHABILITATION OF WATER SUPPLY SYSTEM  
FOR TEN (10) LOCAL TOWNS IN KENYA

MONTH	ORDERED(TONNES)			RECEIVED(TONNES)			ISSUED(TONNES)		
	Alum	TCL	S/Ash	Alum	TCL	S/Ash	Alum	TCL	S/Ash
Jul-99									
Aug-99									
Sep-99									
Oct-99				1.5	1				
Nov-99									
Dec-99									
Jan-00									
Feb-00							1.5	1	
Mar-00									
Apr-00									
May-00									
Jun-00						8			8
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.5</b>	<b>1</b>	<b>8</b>	<b>1.5</b>	<b>1</b>	<b>8</b>

NOTE: The available information seems incomprehensive and further information is required.